NPS54-78-009

NAVAL POSTGRADUATE SCHOOL

Monterey, California

ADVERTISING BUDGETS, ADVERTISING EFFECTIVENESS,

AND THE NAVY'S RECRUITING ADVERTISING PROGRAM

James K. Arima

December 1978

Final Report for Period October 1976 - September 1978

Approved for public release; distribution unlimited.

Prepared for:
Chief of Naval Research, Arlington, VA 22217, and
Navy Personnel Research and Development Center,
San Diego, California 92152.

NAVAL POSTGRADUATE SCHOOL
Monterey, California

Rear Admiral T. F. Dedman
Superintendent

Jack R. Borsting
Provost

This work was supported by the Navy Personnel Research and Development Center, San Diego, California, under its acquisition and initial service programs.

This report was prepared by:

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER: NPS54-78-009	2. GOVT ACCESSION NO.
3. RECIPIENT'S CATALOG NUMBER	
4. TITLE *(and Subtitle)*: Advertising Budgets, Advertising Effectiveness, and the Navy's Recruiting Advertising Program	5. TYPE OF REPORT & PERIOD COVERED: Tech. Report - Final 1 Oct.'76 to 30 Sept.'78
	6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s): James K. Arima	8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS: Naval Postgraduate School, Monterey, CA 93940	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS: N68221 78 WR80009
11. CONTROLLING OFFICE NAME AND ADDRESS: Acquisition and Initial Service (Code 310), Navy Personnel R&D Center, San Diego, CA 92152	12. REPORT DATE: December 1978
	13. NUMBER OF PAGES: 88
14. MONITORING AGENCY NAME & ADDRESS *(if different from Controlling Office)*	15. SECURITY CLASS. *(of this report)*: Unclassified
	15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT *(of this Report)*

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT *(of the abstract entered in Block 20, if different from Report)*

18. SUPPLEMENTARY NOTES

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

Advertising	Communication	Television	Direct mail	Navy
Recruiting	Consumer	Newspapers	Promotions	Impact
Evaluation	Radio	Magazines	Aids	
Budgets	Regression	Effectiveness		

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

A selective review of the literature on advertising effectiveness revealed no generalizable results for setting advertising budget decisions. The primary problem is a lack of knowledge as to how advertising, as input, affects an output, such as sales. All Navy advertising expenditures for 1976 and 1977 were allocated to counties by month for 1976 and 1977 and supplemented with recruiting and environmental data to examine the relationship between advertising and enlistments. Total advertising expenditures were moderately related to total enlistments (R^2 = .442), but this relationship was found to be the result of

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE
S/N 0102-014-6601 |

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

management planning and allocation of resources and goals. When advertising and enlistments were made rate variables, there was no linear relationship because the rate of advertising increased rapidly without a corresponding increase in enlistment rates. A fourth root transformation of advertising rates permitted application of a linear regression model where advertising was found to be the most significant predictor of enlistment rates. Recommendations are made for further studies and actions to evaluate and increase advertising effectiveness.

FOREWORD

The purpose of this study was to selectively review the literature on the evaluation of advertising effectiveness and to examine the relationship between advertising and enlistments in the Navy in order to achieve a better understanding of the Navy's advertising programs and the utilization of its resources. The work was supported by the Navy Personnel Research and Development Center, San Diego, California, under its acquisition and initial service programs headed by Dr. Martin F. Wiskoff. The project monitor was Dr. Robert A. Lakota who provided valuable guidance and suggestions for the program and was most patient and understanding. Similar help and cooperation was also received from Dr. Robert V. Guthrie.

The empirical portions of this study could not have been completed without the full cooperation and support of the Navy Recruiting Command. I am particularly indebted to LCDR H. A. Levien, LCDR P. K. Vanwinkle, and Mr. Wade Badger of the Research and Analysis Division, Plans and Policy Department, and to LCDR W. T. Shiffer, LCDR J. Fyfe, Ms. D. Edwards, Mrs. S. Motley of the Management Systems Division, Recruiting Advertising Department. The report on national media expenditures prepared by Ted Bates, Inc., and sponsored by the Navy Recruiting Command, was an absolutely essential component of this study. Nancy Clott and Jackie DeCosta were the account and research heads, respectively, for this effort.

The opportunity to interact with the Joint Market Analysis Research Committee sponsored by Dr. Albert J. Martin, Director of Acquisitions in the Office of the ASD (MRA&L) and headed by its chairman, Ronald G. Liveris of the US Army Recruiting Command, provided much information and a broad outlook on the marketing problems facing the Armed Forces. The Defense Manpower Data Center (DMDC) was also most helpful in providing essential enlistment and environmental data and the self-report data from the Market Facts surveys. Dr. John R. Goral and MAJ (USAF) Rex L. Klaurens require special mention.

An interim product in this project was the report of January 1978 prepared by Dr. Frederick C. Nold and Dr. Michael K. Block of Rhodes Associates entitled "Evaluation of Navy Advertising Effectiveness." The study was conducted prior to the availability of the Ted Bates, national media report and attempted to augment the then sparse, recruiting command data with the self-report data provided by the Market Facts' "Youth Tracking Surveys" carried out for the Department of Defense. The report provided valuable insight into the dynamics of the recruiting advertising environment, problems in its evaluation, and especially, the need for detailed, appropriate data.

Finally, I must express my deep gratitude and indebtedness to LT Thomas C. Williams, Jr. for organizing and analyzing the data used in Part II of this study and providing valuable suggestions and observations in conjunction with his excellent master's thesis in the Operations Research curriculum of the Naval Postgraduate School. Mrs. Pat Meadows, programmer for the Departments of Operations Research and Administrative Sciences, was, as always, most helpful. Ms. Sunny Matteson did her usual conscientious job in typing the manuscript.

James K. Arima

SUMMARY

Since the advent of the all-volunteer force (AVF), Navy advertising expenditures for recruiting have increased approximately 10 times over previous years in constant dollars and averaged 25.1 million in actual dollars during the first three years of the AVF. As a result of Congressional concern over the size of these expenditures, advertising budget levels have been reduced considerably since then, but there is the continuing question of how much is actually needed. Any answer to the question is difficult to justify because the relationship between advertising and enlistments is not known.

The problem of determining advertising budgets has existed for a much longer time in the civilian sector without definitive answers. On the basis of much experience, many firms may have some idea as to what is adequate and where the upper and lower bounds may be, but the actual budget decision is generally some constant proportion of a production or sales decision. Since organizations usually come close to their projections, the advertising budget decision appears to be validated.

Experimental or data-based approaches to determine the relationship between advertising budgets and sales, or some other bottom-line measure, have only met with limited success. Where budgets have been deliberately manipulated in control or levels experiments, the presence of a great many other concurrent effects on the output measure has made the results equivocal. The alternative is a much larger number of test areas or a long sequence of repeated experiments. In both cases, the need is to increase the number of data points, because the method tends to be very data limited.

Where data-based approaches have been used to take advantage of naturally occurring experiments, the primary problem has been in determining cause and effect relationships. This problem is not insurmountable, but the data requirements and analytical procedures are quite formidable. A not easily surmountable problem occurs when advertising is found to have no reliable effect on the output measure. In this case, the method cannot determine what the effects might be if advertising expenditures considerably different from those that were found to occur naturally were to be implemented. Nevertheless, the data-based approach is usually not data limited, and it has the advantage of not interfering with or causing a reaction in the process being evaluated.

When those actually engaged in the advertising process--agencies and advertising research firms--perform research on the effectiveness of advertising, they tend to be satisfied with intermediate output measures, such as awareness of and attitude toward the product or service being advertised. Rather than budget levels, their concern is with the message, the segmentation of the population into target

audiences, and the reach and frequency with which the audiences are contacted. The bridge between awareness and attitudes on one hand, and sales, say, on the other is not often crossed. Moreover, the rationale for the population segmentation and the appropriateness of the message are usually not validated in terms of their effect on the customer's bottom-line measures. The Navy's advertising program in the national media conducted through its agencies has many of these characteristics.

In addition to agency advertising through the national media, the Navy internally operates a local advertising management system (LAMS) and creates and distributes recruiting aids (RAD items). There is also a public service advertising program in which the media are solicited to provide free space or time for Navy recruiting advertisements. Control experiments have not been attempted, although they have been recommended and planned. Data-based approaches were largely inappropriate because of data limitations with respect to national media advertising. This problem was corrected when the Navy Recruiting Command contracted with Ted Bates to reallocate or assign all national advertising expenditures in calendar years 1976 and 1977 to individual counties by month, media, and advertising programs--such as general enlisted, minority, and officer. The completion of this project made the empirical portion of the study reported herein possible.

The purpose of the empirical study was to gain an understanding of the relationship between advertising and enlistments in the Navy in order to make recommendations for the evaluation of its advertising effectiveness and the making of budget levels decisions. The Ted Bates national media data for general enlisted programs were supplemented by Navy and DOD data allocated to the county level in proportion to the QMA. The LAMS and RAD expenditures were only available by quarter, so they were allocated to the three months within a quarter evenly. The national, monthly, unemployment rate for youths aged 16-19 years was also obtained and assigned to all counties. In all, the most essential variables for examining the relationship between Navy advertising and enlistments were available at a very low level of aggregation--the county by month. These data included:

Number of first-term male (QUEBEC or Q) enlistees
Number of first-term male enlistees who were high-school graduates with AFQT scores equal to or greater than 50
Qualified military availables (QMA)
Enlistment (QUEBEC) goals
Number of canvassers
Total media expenditures
Total LAMS expenditures
Total RAD expenditures
Total of all advertising expenditures
Number of high-school graduates
Unemployment rate
Year (1976, 1977)

The advertising expenditures were also lagged by 1 and 2 months so that the carryover effect of current advertising could be evaluated 1 and 2 months later. The enlistees who were high-school graduates and had AFQT scores of 50 or better were considered to be "quality" enlistees. All enlistees were assigned to the month in which they actually enlisted--the "contract signed" date--and not the often, erroneously used date when they shipped to the RTC.

Some outlier cases originating from very small counties were dropped, as were county-months that had no enlistments. All cases for December 1976 were dropped as outliers because enlistments were more than double those of previous months due to the pending, year-end termination of Veterans' benefits. These figures were:

Average for First 11 Months	Q Enlistments in December
7,737	16,457

An examination of the remaining raw data showed very high commonalities among all of the key input and output recruiting variables, and all were closely related to the QMA. The percent of variation in these variables predictable from a knowledge of the QMA, alone, was:

Variable	Percent Predictable
Average of advertising categories	51.8
Total Q enlistments	84.6
Q enlistment goals	84.6
Number of canvassers	96.0

The amount of variation in Q enlistments that was predictable from a knowledge of advertising variables averaged 42.2 percent. These results indicated that, as in civilian industry, a major portion of the input-output relationship is predetermined by management planning which, in this case, relies heavily on the QMA as a planning base. Any analysis or research that uses only the raw data would be capitalizing on, or merely recapturing, management strategy.

To escape this situation the key variables were normalized or indexed by the planning base, the QMA. They then became rate variables that could vary independently of the QMA. When this was done to the study data, the previously observed relationships were highly attenuated and the relationship between advertising and Q enlistments disappeared completely. This was found to be due to a highly accelerated growth of the advertising rate compared with the enlistment rate. As advertising rates grew larger, they were not accompanied by similar increases in the enlistment rate.

A fourth root transformation of the advertising variables before they were divided by the QMA established a linear relationship between the advertising rate and the enlistment rate. The rate variables were

then entered into an ordinary least squares, linear regression model to determine the relationships between the input variables considered simultaneously and the two output (enlistment) variables considered independently. It was found that 55.6 percent of the variation in Q enlistment rates and 73.7 percent of the variation in quality enlisted rates could be predicted using 11 and 10 input variables, respectively. These variables, in order of the magnitude of their effects on the enlistment rates, were:

1. The three transformed advertising variables in their current and lagged 2-month forms
2. The proportion of high school graduates in a county
3. The year in which the county-month appeared
4. Canvassers per QMA
5. Unemployment rate, which had a small, but negative effect

The advertising variables had the greatest effect, by far, in predicting the enlistment rates. These results indicate that a close relationship between the advertising rate and the enlistment rate, especially in the case of the important quality enlistees, can be achieved by a simple change in the distribution of advertising and that this relationship is much closer to the enlistment rates than the distribution of canvassers or goals. That is, an increment in the advertising rate had a much greater increment in the enlistment rate than a similar increment in canvassers per QMA or goals per QMA.

The importance of the high-school graduates per QMA in predicting the enlistment rate confirmed previous research by the author which showed the sensitivity of enlistments to the educational quality of an area.

The contribution of the year variable is important because it raises questions about the allocation of advertising resources and effort. Except for one month of radio, 1976 had no paid advertising in the electronic media. The following year, however, had a full program of paid radio advertising, and paid television advertising began in April 1977. The electronic media accounted for a majority of the media costs. A comparison of the years shows:

Item	1976	1977
Total Q enlistments	101,568*	88,556
Quality enlistments	51,309*	37,495
Average per month canvassers	3,212	3,360
Media expenditures (calendar year)	$3,916,371	$5,803,669

*Includes December 1976.

Goals per QMA was a variable that was conspicuous by its absence in affecting the enlistment rate. This was attributed to the influence

of the DEP status and goal accomplishment in the near past as contributing factors, along with goals, in driving the recruiting effort. A better measure than just goals was required to account for some of the unexplained variation in enlistment rates.

RECOMMENDATIONS

The following recommendations are made on the basis of the selective literature review and the background research reported in Part I of this study and the findings of the empirical analysis reported in Part II.

1. Whenever the temporal coincidence of recruiting operations--such as advertising and current production--must be established for research or management purposes, the date of actual enlistment--i.e., a "contract signed" date--should be used for the production measure; research products or managerial decisions that use production measures, such as shipments to the RTCs, must be considered highly suspect when there is a requirement for temporal coincidence.

2. Measures of recruiting inputs and outputs should be made into rate measures reflecting qualitative aspects of the operations for research purposes; research products that do not do this should be highly suspect, since the relationship among raw measures of key recruiting variables are primarily predetermined by management decision.

3. Control experiments to evaluate the effects of budget levels should take into consideration a large number of contemporaneous operational and situational variables to ensure unambiguous and generalizable results; this implicates the need for a large number of test areas and tests of sufficient duration.

4. Media mixes and the allocation of advertising resources among national media, local advertising, and recruiting aids should be examined to determine the optimal distribution of effort among these alternatives; specifically, the utility of paid radio and television advertising relative to other forms of advertising and promotions requires immediate and close examination.

5. Research should be undertaken to determine the effects on enlistments that varying the advertising rate may have, given the current potential of an area; that is, should larger rates of advertising be devoted to already highly producing areas or should they be addressed to improving poor areas?

6. Assumptions, guidelines, and policies for the conduct of advertising operations should be critically examined for the evidence on which they are based and the actual results they are producing; more specifically, the manner of calculation and utilization of the Recruitment Development Index (RDI) should be examined to determine their consequences.

7. The effects of goals, the DEP status, and, possibly, goal attainment in the immediate past should be identified and combined into a single measure that describes a force that drives enlistments in an NRD at a particular point in time.

8. An attempt should be made to develop a comprehensive, testable, and useful model that takes advertising as a communication process involving meassage, reach, frequency, and the target audience and relates this process to hard measures of recruit production.

9. Advertising expenditures should be documented in the monthly enlistment summary of the Navy Recruiting Command so that the relationship between expenditures and enlistments can be monitored.

CONTENTS

Page

Foreword i
Summary iii
Recommendations ix

PART I. BACKGROUND

ADVERTISING BUDGET DECISIONS, EVALUATING ADVERTISING EFFECTIVENESS, AND NAVY ADVERTISING PROGRAMS

INTRODUCTION 1

Orientation of the Study 1
Magnitude of Navy Advertising 1

PROBLEMS IN EVALUATING ADVERTISING EFFECTIVENESS 5

General Considerations 5
The Simultaneity Problem 5
Management Decision-Making as an Evaluation Objective 7
Level of Investigation 11

NAVY ADVERTISING PROGRAM 13

Organization for Navy Advertising 13
Program Areas 15
Media Utilization 19
Objectives of Navy Advertising 23

PROBLEMS IN EVALUATING THE EFFECTIVENESS OF NAVY RECRUITING ADVERTISING 25

Multiple Determinants of Personnel Acquisition 25

Internal Determinants of Productivity 25
External Determinants of Productivity 27

Methodological Considerations 28
Data Availability 28

PART II. EMPIRICAL STUDY

THE RELATIONSHIP BETWEEN ADVERTISING RATES

AND ENLISTMENT RATES IN THE NAVY

Page

METHOD 33

Approach 33
Data Sources and Basic Study Variables 33

Advertising Data 33
Recruiting Data 35
Situational Data 36
Data Summary 39

Data Refinement for Analysis 39

Outliers 39
Created Variables 41
Normalization and Transformation of Variables 43

Model Fitting 49

RESULTS 51

Exploratory Efforts 51
Total Enlistments (ENLQMA) and Advertising 51
Quality Enlistments (GR50QM) and Advertising 53
Summary Results 53

DISCUSSION 55

Study Methodology 55
Advertising Effectiveness and Its Evaluation 58

SUMMARY AND CONCLUSIONS 65

REFERENCES 67

ABBREVIATIONS 71

LIST OF TABLES

		Page
1.	Total Navy Advertising Budget	2
2.	Navy Goals, Goal Attainment, and Canvasser Resources	4
3.	Navy Expenditures for Local Advertising (LAMS) and Recruiting Aids (RAD)	20
4.	Distribution of Media Advertising Dollars with and without Radio and Television	22
5.	Monthly Media Expenditures	34
6.	Monthly Q Goal, Canvassers, and Unemployment	37
7.	Monthly First-term (Q) Enlistments	38
8.	Distribution of Total Monthly Enlistments per QMA	40
9.	Comparison of Cases Included in the Study with Excluded Outlier Cases	42
10.	Summary of Variables in the Enlistment Models	44
11.	Correlation among Variables Representing Raw Data	45
12.	Correlation among Variables after Normalization	46
13.	Summary of Variables after Normalization and Transformation	47
14.	Correlation among Variables after Normalization and Transformation	48
15.	Stepwise Multiple Regression of Total Enlistments (ENLQMA)	52
16.	Stepwise Multiple Regression of Quality Enlistments (GR50QM)	54
17.	Comparison of Media Advertising with and without Paid Electronic Media and Concurrent Goal Accomplishment	57
18.	Joint Distribution of Total Enlistments/QMA with Total Advertising/QMA before and after Fourth Root Transformation of Advertising	60

LIST OF FIGURES

Page

1. Geographic Organization of the Navy Recruiting Command 14

2. Allocation of Navy Recruiting Resources to Major Program Areas in FY 1977 16

PART I. BACKGROUND

ADVERTISING BUDGET DECISIONS, EVALUATING ADVERTISING EFFECTIVENESS, AND NAVY ADVERTISING PROGRAMS

INTRODUCTION

Orientation of the Study

The need to determine the effectiveness of advertising is a matter of major concern in any marketing effort (Lipstein & McGuire, 1978). It is no different in the case of military advertising for recruiting purposes (Comptroller General, 1976). The All-Volunteer Force (AVF) came into existence in July 1973, and it has presented a major challenge as a marketing effort. Enlistment contracts must be marketed and sold in large numbers to staff the military forces adequately in the total number of personnel and in the requisite quality. The competition to attract quality youth entering the labor market involves not only the entire civil sector, but there is also keen competition among the services as well. Thus, the services compete with the civil sector in the context of the society-at-large, and there is a share-of-the-market competition within that subset of American youth that is willing to consider the military services for an entry-level job. Complicating the market-share picture are variations in the requirements, attractiveness, and costs (negative aspects) of service in any one of the Armed Forces.

The purpose of this study was to examine the Navy's advertising in this competitive market with no delusions about finding a definitive answer to the question of the effectiveness of the Navy's advertising effort. Rather, the objectives of the study were to become familiar with the structure and dynamics of Navy advertising, examine available data for possible trends between advertising and response measures in the target audience, and to make recommendations for a program of increasingly definitive studies to determine the effectiveness of Navy advertising and to suggest means for increasing its effectiveness.

Magnitude of Navy Advertising

A record of advertising expenditures by the Navy over the last fifteen years is presented in Table 1. There it can be seen that spending on advertising was just a little more than a million dollars in FY 1964. This was less than .01 percent of all Navy expenditures during the fiscal year. Expenditures, in constant dollars, remained very stable in subsequent years, even with the large increase in personnel requirements as a result of the war in Vietnam. High levels of advertising were unnecessary because individuals faced with conscription--and probably service in one of the combat arms of the Army--"voluntarily" enlisted for longer terms of service in order to have a choice of service and, possibly, a choice as to area of training and specialization. In FY 1972, however, with the peak involvement in Vietnam (FY 1969) past and the prospects of the AVF a reality, Navy advertising expenditures increased almost fourfold (in real dollars) over those in FY 1971. This was followed by a threefold increase in FY 1973 over the FY 1972 expenditures. It was FY 1973, of course, which saw a

Table 1

Total Navy Advertising Budget

(in thousdands of dollars)

FY	Current Dollars[1]	Constant Dollars[2]
64	1,004	1,088
65	919	981
66	1,029	1,072
67[3]	1,324	1,342
68	1,298	1,271
69	1,465	1,369
70	1,667	1,474
71	1,798	1,513
72	7,051	5,719
73	23,017	17,815
74	26,753	19,055
75	25,549	16,537
76	16,839	10,150
77[4]	16,389	9,228
78	18,030	9,836

[1]Source: Navy Recruiting Command.

[2]Calendar Year 1967 = 100

[3]Current dollars and constant dollar figures are not identical in 67 because expenditure figures are FY 67 and the deflator is 100 in CY 67.

[4]Change in start of fiscal year from July to October. Advertising expenditures during the transitional quarter (TQ) were $3,318,000 in current dollars and $1,964,000 in constant dollars.

major shift in the defense posture with the withdrawal from Vietnam and the conclusion of the draft. Recent years have brought about a considerable drop from the peak expenditures in FY 1974, the first complete year of the AVF, and expenditures seem to have plateaued at about six times the level of the last year completely unaffected by the AVF (FY 1971).

Even the peak expenditures for advertising in FY 1974 represented no more than .5 percent of direct personnel costs and .1 percent of total Navy appropriations for that year. While the absolute amounts may seem to be considerable, the relative costs for advertising cannot be said to be a significant portion of the Navy's budget.

Another perspective for assessing the magnitude of the Navy's advertising effort would be to compare expenditures with recruiting goals, the recruits and reenlistments attained, and the support provided the canvasser in the field. Table 2, therefore, shows the total goals for all enlisted programs, both USN and USNR, since the AVF was instituted and the attainment of those goals. Also shown is the size of the canvasser force that produced the enlisted acquisitions. The expenditures in Table 1 include those for officer programs so that the amount earmarked for enlisted programs is somewhat smaller. In gross, "ballpark" figures, somewhere between 100 to 200 dollars in advertising has been spent for one recruit, or, from the standpoint of the recruiter, approximately 5,000 dollars are spent per year in support of one canvasser in the field. While these figures are not unduly great, on an individual basis, they do add up to a multimillion dollar program of Navy advertising and are greater than unit advertising expenditures for durable items, such as automobiles. Thus, there is a basis for questioning the effectiveness of the advertising program, either from the total amount expended or the results that are produced.

Table 2

Navy Goals, Goal Attainment, and Canvasser Resources in the AVF Period*

Fiscal Year	Goal	Obtained	Canvassers
1974	100,050	101,346	3,576
1975	112,130	113,027	3,760
1976	103,325	103,587	3,158
1976(TQ)	35,779	33,887	3,266
1977	116,314	111,557	3,477

*Includes all USN and USNR, first-term and reenlistees, men and women. Source: Fiscal Year Navy Recruiting Command program summaries.

PROBLEMS IN EVALUATING ADVERTISING EFFECTIVENESS

General Considerations

Whereas the need to assess the effectiveness of advertising is universally acknowledged, there is much less agreement as to how it should be done. At the outset, the distinction between advertising as a communication process and advertising as a part of a marketing program must be recognized. A great deal of what has been called advertising research has been, and continues to be, undertaken in the former area. There is a plethora of advertising research firms that would undertake projects in this context. The basic ingredients for such research are a very detailed segmentaion of the population to identify the target audiences and then an evaluation of the reach and frequency of the advertising campaign in contacting that audience. Since the validity of the original segmentation process is frequently not empirically established but based on intuition, conjecture, and faith (Jacoby, 1976), this type of research is basically assessing the efficiency of the campaign and not its effectiveness.

When the research attempts to determine whether the intended message was communicated and, additionally, whether a desired change in attitude occurred, then it can be considered to be evaluating the effectiveness of advertising. Those who consider advertising to be a communicative process may stop here. But there are the many who insist that advertising, to be considered effective, must contribute to the objectives of the marketing program of which it is a part. One indication of this effectiveness might be that it initiated action--e.g., contacting the recruiting station or visiting the product dealer. Those who would stop here insist that so many other factors enter the picture at this point that it would not do justice to advertising to insist that it must also account for the consumatory response such as the purchase of a product or a signature on an enlistment contract. This leaves the large group of persons who insist that advertising, to be considered effective, must contribute to the objectives of the organization--i.e., that it must show an effect on the "bottom line." The significance of this position, beyond that of basic management philosophy, arises when apparently effective communicative processes--those that inform and change attitudes--show no effect on the so-called bottom line. In fact, the situation may be just the opposite when, for example, initiating action or making a consumatory response may change attitudes and the possession of product information. Accordingly, it would seem advisable to insist that advertising effectiveness must be revealed through its contribution to marketing program goals and that it does this in the direction specified by advertising as a communicative process.

The Simultaneity Problem

The simultaneity problem arises when an outcome measure, such as sales, and the advertising effort--say, in dollars--covary because they are mediated by a common factor. That common factor is planning. Based on an estimate of demand and the production and marketing

capabilities of the organization, a sales target is established and resources are budgeted and allocated accordingly (Little, 1975a). When planned sales are up, so is the advertising budget; when retrenchment in marketing plans occurs, the advertising level goes down. Thus, advertising is correlated with sales, and the unwary researcher may be trapped into positing a causal relationship from advertising to sales. Schmalensee (1972) analyzes this problem at length, cites studies that have ignored the existing simultaneity and shows the resulting ambiguity of the study conclusions for not having adequately considered the bidirectional relationship between advertising and sales.

A similar condition has been alluded to, above, with respect to attitude change and consumer response. The direction of the effect of one on the other is very frequently in question. Social psychologists have shown that significant attitude change can occur after a response is made (Kiesler, Collins, & Miller, 1969). The cognitive dissonance concepts of Festinger (1957), for example, use a change in attitude to reduce the dissonance or conflict that may arise after one's commitment to a particular, behavioral course of action. The result is that the favorable attitudes toward a product that may occur after the purchase of the item could be considerably greater than any favorable attitude existing prior to its purchase.

The same situation may exist with awareness measures. That is, the unprompted recall of an ad may be more probable for persons who have purchased the product, but this heightened sensitivity to the advertising could well have occurred after the purchase, rather than before, as often assumed. For example, the recall of a new Virginia Slims cigarette ad may be greater among those who already smoke Virginia Slims than among those who might have been induced by the ad to try a pack of the cigarettes.

One way to clarify the direction of effect is through the use of simultaneous equations (Bass, 1969; Schmalensee, 1974). The principle is to have equations for each possible direction of effect involving the variables in question. Say that the variables of interest are advertising expenditures and sales. Then, each must appear as a dependent and an independent variable in separate equations to permit comparison of their relative effects vis-a-vis each other. The analysis, to be meaningful, has to be dynamic. Data from different points in time are required to unscramble the directionality question. Dhalla (1978) refers to this strategy as the 2-stage, least squares method. Thus, data requirements are considerably greater when simultaneous equations are used.

Aaker and Day (1974) have used the simultaneous equation method to investigate the relationships among advertising, consumer awareness, attitudes, and behavior (the purchase of instant coffee brands). They called their set of equations recursive, and brought out the fact that purchase of a brand of instant coffee predicted the

favorability of attitude toward that brand as well or better than the prediction that a favorable attitude toward a brand would result in its purchase. Their results also indicated that awareness of advertising--its informative aspects--can be directly related to sales without being mediated by a corresponding change in attitude as hypothesized by most communication models of the advertising process (Engel, Kollat, & Blackwell, 1973; Kassarjian & Robertson, 1973).

Sociologists and psychologists have used similar designs in what has been called cross-panel and path analysis methods (Blalock, 1964; Yee & Gage, 1968; Simonton, 1977; Young, 1977). Thus, there is considerable guidance available to be aware of the problem of simultaneously determined effects in advertising and to make appropriate adjustments in the research design. To recognize the situation when it exists may be more difficult, and it may not be possible to correct for its presence. That is, limitations in the data may not permit the application of appropriate evaluative techniques. Finally, there is another way to circumvent the problem of inferring causation, and that is the controlled experiment (which will be discussed later).

In addition to the problem of endogenous and exogenous variables affecting desired outcomes simultaneously with advertising, there is a similar problem in advertising's effects on itself. One manifestation of this problem is a residual effect of advertising that carries over into the current period to affect current outcomes along with current advertising. From the managerial standpoint, advertising in this perspective becomes an investment, rather than merely a current expense. The typical method for assessing the carryover effect has been through the use of distributed lags in a regression equation in which advertising in prior periods enters the equation as a potential determinant of current outcomes (Palda, 1964). A problem that is more difficult to unravel and that tends to be situation specific with no general solution is the overlap of advertising in the target audience when several media are used simultaneously. These temporal and geographic problems of the effects of advertising on itself are characteristic of the Navy's advertising effort.

Finally, there are other characteristics of the advertising process, itself, that have an effect on the effectiveness of advertising. These include such factors as the copy, media selection, the distribution of advertising among the media, and the temporal aspects of a campaign, such as the frequency and spacing of ads and its overall length.

Management Decision-Making as an Evaluation Objective

Discussed above was the purpose of advertising conceived as a communication process that begins with informing the potential customer about a product and eventually proceeds through attitude change and action initiation to product purchase. Krugman (1975) seeks to explain the cognitive processes of the potential consumer during this sequence as a consequence of repeated exposures to an ad and hypothesizes the relationships between this covert behavior and advertising

that will make advertising effective. This approach is concerned with advertising, itself, as the object of study. The purpose of advertising may, however, be considerably different when examined from the standpoint of management.

While maintaining or increasing sales may be the commonly stated objective of advertising, there are other management considerations of equal or greater importance. Share of the market, for example, is probably of greater concern than an absolute level of sales. Carried to the extreme, this objective may have the effect of stifling or destroying competition. Whether and to what degree this is possible in an industry has been the subject of concern, critique, and conjecture (Comanor & Wilson, 1974; Ferguson, 1974). The possibility that excessive advertising by the services might seriously disrupt the marketplace for youth just entering the job market may have been behind the restriction placed by Congress in the early years of the AVF that prevented the services from purchasing advertising time on the electronic media. Creating good will and a favorable image may be other objectives of management. Much institutional advertising is of this nature. But whatever the stated objectives may be, the management problem common to them is the need for a budget decision. As a result, much research in advertising has been devoted to the process of making a budget decision. Then, research strategy may become considerably changed when the evaluation of advertising's effectiveness is subordinate to--actually, an input to--a budget decision question. The question, in its broadest sense, is all-pervasive and asks: How much is enough?

One approach toward answering such questions is by building models that simulate the advertising process (Aaker & Myers, 1975; Dhalla, 1977; Little, 1966, 1975a, 1975b; Rao, 1970; Shane 1977). Most models however, are normative. They are analytical, provide insights into the advertising process, and elicit guidelines for planning advertising programs and budgets. Such theoretical concepts as the shape of the response curve to advertising, the existence of a threshold level below which advertising produces no effects, the possibility of a downward bend in the curve with excessive advertising, and the shape and slope of the sales degradation curve with cessation of advertising lead to a host of decision possibilities that may involve criteria such as minimizing expenses, distributing expenses in an optimal manner over various media, maximizing exposure, or distributing expenditures optimally over time--such as by pulsing. The problems with these models for the specific case are the uncertain validity of the model for the particular decision and the lack of real-world data for practical application of the model. The former case is the well-known one of a solution looking for a problem. Correlating real world end states or outcomes with model predictions, as Shane (1977) does with election results predicted on the basis of relative advertising expenditures, does not validate the model, although the results may be reassuring. What is essentially needed is a demonstrated correspondence between the path-time histories of the input-output transformations in both cases to ensure the fit between the

model and the real world (Naylor & Finger, 1967; Van Horn, 1971). The problem in doing this resolves itself into the second of the problems mentioned above, the lack of real-world data.

The lack or even complete absence of real-world data to apply or calibrate a model results in a need to conduct experiments to obtain that data. These experiments have been referred to as levels experiments or control experiments, reflecting the process of actually manipulating budget levels and comparing them against control conditions to generate the needed data points. Little's (1966, 1975a, 1975b) models are self-adjusting by sampling regions around the predicted sales-response curves with budget-level trials. Dhalla (1977) also requires either, or both, control experiments and "minitests" to validate and adjust his model's outputs for setting advertising budget levels. There is a compelling need that is felt by management in the Navy's case to generate similar data because there is no good answer to the annual question raised by Congressional committees as to how much is enough.

In theory the controlled experiment is appropriate and even necessary. In practice, very close examination of the situation and considerable thought should be devoted to the decision of embarking on a course of control experiments. The reason is that the payoffs may not be worth the costs. The problem stems from the incompatible needs to keep the experiments from interfering as little as possible with ongoing operations and to execute a substantial number of replications to provide confidence in the results. Specific problems may include the following. Management will permit experimentation only in peripheral areas to prevent harm from occurring to the key producing areas and to maintain revenues, resulting in a lack of representativeness in the sample. There may be an insufficient duration of the tests--especially at low levels of support--to dissipate the carryover effect from a previous level of support because of management's fears of permanently damaging a market. There is very likely to be an insufficient number of territories to evaluate or control for some of the determinants of sales or productivity other than expenditures for advertising. In fact, there may not be a sufficient number of territories to evaluate the primary effects of budget levels if the variation in productivity within each budget level tends to be large with respect to the number and spacing of the budget levels designed into the experiment. The effects on the area sales force of manipulating the advertising budget seem never to be controlled or evaluated. Thus, it is not known whether greater productivity, if it occurs, was due to an increase in advertising level or an increase in worker-management level of effort because greater productivity was obviously expected of them, or some of both. Similarly, a lowered budget level could motivate the field force to work harder because it obviously has to in order to maintain productivity or just to show what it can do without support from above; it might also result in lowered effort.

Perhaps the best-known program of controlled experimentation is that conducted by Anheuser-Busch (A-B) over the period 1962 to 1968 (Aaker & Myers, 1974, pp. 60-61). A portion of these experiments is reported in detail by Ackoff and Emshoff (1975) and Rao (1970); critical reviews of these reports are provided by Allaire (1975) and Ted Bates (Note 1). In these experiments, advertising budgets in some experimental areas were decreased to essentially zero and in others, increased by 200 percent or more to completely dominate the advertising of beer in the area. The results of the manipulations produced relatively small deviations from projected sales. Sales, in many instances, were found to rise or fall with reductions or increases in advertising. Areas were apparently able to meet projected sales levels with essentially no advertising support. Many explanations were offered for the findings but they were not based on a scientific evaluation of the experiments. Controlled experimentation during this period was conducted in series of "mini experiments" and the statistical evaluation of the results almost generally showed no significant effects of advertising budgets. Allaire (1975) attributed this to the presence of too many other factors influencing sales so that the unexplained variance (error) overwhelms any effects that might have resulted with the manipulation of budget levels. Some of these other influences could have been the variability in the price of beer, the effects of competitive advertising, a drastic reduction in the number of competing breweries (from 170 to 70 during the period 1960 to 1971), and a change in the distribution of advertising dollars over media--e.g., from 20 percent to zero for outdoor advertising, from 5 percent to 50 for network television in the period 1961 to 1974 (Allaire, 1975; Ted Bates, Note 1). More recently, the beer industry experienced a dramatic shift in advertising and product image due to Miller's overwhelming success in emphasizing its "light beer." Under such conditions, even increases in advertising levels using the same old themes would have shown a decrease in sales or market share for competitors.

One general, although important, decision by A-B management based on the experimental program was that it could decrease its advertising expenditures, which it did to a very considerable degree (Aaker & Myers, 1975; Ackoff & Emshoff, 1975b). The assumption was that A-B was advertising at a supersaturation point, and this could have accounted, in part, for the inconclusive results of the experiments. The conclusions to be drawn from the A-B program with respect to the utility of controlled, budget-level experiments is to use them for testing the extremes or limits of budgeting to answer a question such as "How much is too much?" In fact, budget-level tests would be necessary in most cases to answer this type of a question because such extreme instances are not likely to be found in existing operational programs. But if the question to be answered by the research requires greater sensitivity as to advertising's effects on an ongoing program, available data generated by the operational program should be used. This usually results in a regression approach. Where desired data are not available, data generation requirements should be instituted and institutionalized. The reason for this conclusion is that there are so

many factors other than advertising that affect outcomes that it is neither practicable nor possible to design controlled experiments that can include these effects in the design. On the other hand, there is considerable freedom in including variables in a regression approach as long as the data base is sufficiently large. A combination of the approaches might be possible in which the advertising variable has been deliberately manipulated in a regression or similar evaluative model.

Level of Investigation

The problems discussed above relate to the evaluation of advertising effectiveness in the aggregate using macro approaches. The effects of advertising are studied over large classes of people, such as housewives, car owners, beer consumers, or persons 17 to 21 years of age who are not enrolled in college or planning to go to college--the recruiting subpopulation. Bass (1969), citing Kuehn and Rohloff, states that the problems and difficulty in isolating the effects of advertising using the aggregate approach are so formidable that the researcher may argue that to make progress in researching the effectiveness of advertising, research has to turn to the household or individual as the unit of investigation. This, then, would be a micro approach. Whereas the primary advertising dimension in the aggregate approach is a measure of expenditures for advertising, the micro approach emphasizes the content of advertising in terms of copy and psychological appeals. An example of the latter would be the research performed for the U.S. Army Recruiting Command (USAREC) by the Human Resources Research Organization (HumRRO) on pretesting Army advertising copy (Wilson & Rosen, 1973). The contextual variables used in the aggregate approach are primarily economic and demographic, such as discretionary income and employment rates. The emphasis in the micro approach would be on sociological variables relating to the household or psychological variables in the case of the individual, such as information search and processing, sensory and perceptual processes, emotion and motivation, attitude and attitude change, decision making, and personality. Thus, the problem of choosing the level of investigation is essentially that of the researcher.

The researcher who turns to households and intraindividual research is in the general area of consumer research, which, in turn, involves many scientific disciplines. Reductionism in the subject matter of research has not, however, proven to be a panacea for the problems that confront researchers in advertising and marketing. For example, Jacoby (1976) believes that 85 percent of what had been published as consumer psychology prior to 1968 was of rather low and questionable worth and that by 1975, somewhat less than 50 percent of the research could be so classified. He attributed the source of less-than-satisfactory results, in large part, to a proliferation of inadequately researched and highly overlapping measures used in attempting to find causal relationships for such central constructs as brand loyalty. More recently, methodological and theoretical advances, such as the INDSCALE method for scaling individual beliefs and attitudes multidimensionally (Carroll & Chang, 1970), and the clear specification of

measures and their relationships that could lead to attitude change and purchase behavior (Ajzen & Fishbein, 1977; Fishbein & Ajzen, 1972) have served to improve research in consumer behavior. Jacoby (1976) states that a more comprehensive examination of purchase behavior as a complete, individual, information receiving, processing, and decision-making procedure has placed consumer research in a better perspective for producing reliable and valid results. With respect to the central problem of this study--evaluating advertising effectiveness--a frequent shortcoming of consumer research is the absence of a demonstration of the relevance of research findings to the effective use of advertising. To show that certain theoretical concepts can be used to predict a limited criterion--such as a certain attitude--at a marginally significant statistical level is a far step from the return that could be expected by using the concepts in an advertising campaign. Thus, we come full circle to the discussion that initiated this section of the study. The individual and aggregate approaches must complement each other, and only efforts that are consistent with the best theoretical notions in both areas hold promise of being able to evaluate the effectiveness of advertising in any sales or marketing campaign.

NAVY ADVERTISING PROGRAM

In order to evaluate the effectiveness of Navy advertising, there must be a general awareness of the existing organization for advertising and its policies and procedures. In addition, specific knowledge is required of the objectives of the program. This awareness or knowledge is required to assess the sources of strengths and weaknesses and the effects that factors internal to its operations might have on the effectiveness of the advertising. It goes without saying that program evaluation is not possible without knowledge of its objectives, although there is the collateral area of inquiry that could ask what the objectives should be. To explain these aspects of Navy advertising creates a problem because of the sheer magnitude of detail that is involved and the frequent changes that occur. Accordingly, the exposition will be selective, rather than comprehensive, and the criterion for selection will be those features and items that are characteristic of the effort. Attention will be directed to enlisted programs. The sources of the material directly pertaining to advertising are the fiscal year, communication plans published by the Recruiting Advertising Department of the Navy Recruiting Command (NRC). Much of the organizational information is based on the research done for a systems analysis of Navy recruiting by Arima (1976).

Organization for Navy Advertising

The Navy recruiting effort and its advertising are carried out by the Navy Recruiting Command (NRC). The headquarters of the organization, designated CNRC (for Commander, Navy Recruiting Command), plans and directs the advertising program through its Recruiting Advertising Department. The operating elements of the command include six Navy Recruiting Areas (NRA) and the 43 Navy Recruiting Districts (NRD) under them. (See Figure 1.) Both the NRA and NRD manage and use funds in the local advertising management system (LAMS) through their public affairs officers. The NRDs may have a small laboratory for creating graphic materials for local advertising. In addition, each has a large store of recruiting aids for distribution to recruiters. Recruiting aids include promotional items, such as imprinted pencils; graphic items, such as posters and bumper stickers; printed brochures describing various Navy programs and Navy life; and counter top or bulletin board displays with reply coupons.

Under the direct operation of CNRC are two, field, advertising activities. One is the Navy National Recruiting Information Center (NNRIC) at Macon, Georgia, for receiving and processing the toll-free telephone inquiries directed to the wide area telephone service (WATS) numbers in response to Navy ads. The processed inquiries are forwarded to the other field activity, the Navy Opportunities Information Center (NOIC) at Pelham Manor, New York. This office operates the direct-mail advertising programs through a contractor. The contractor also provides a management information service that stores the information developed through NNRIC and the coupons from magazines and direct mail enclosures mailed to NOIC. Other information to support the advertising effort, much of it generated in the creation of mailing lists, is also stored.

Figure 1. Geographic Organization of the Navy Recruiting Command

The Recruiting Advertising Department at CNRC has two divisions representing the functional breakdown of the advertising effort. The Advertising Operations Division is oriented toward national advertising and works through agencies that are contracted to create and market programs on a national basis. The primary contractor carries the major load for all programs and media. There are also agencies for minority programs and the previously mentioned, direct-mail service. The contracted service provided is essentially of the same general nature as that found in the civil sector. The operating link with the contractor is through program advertising managers in the Advertising Operations Division. Contractors are also represented in the division through their liaison personnel and account executives.

The other main division plans and creates recruiting aids and is appropriately named the Recruiting Aids Division. Their work is essentially done in-house, except for the contracting out of graphic services, printing, and similar production activities. To help the division provide appropriate materials, there is a RAMS (Recruiting Aids Management System) Advisory Council made up of experienced recruiting aids personnel in the NRDs.

There is also a very important office in the Recruiting Advertising Department--the Management Systems Division--that creates the communication plan and tracks and monitors progress in the programs. One of the latter is the NALTS (Navy Lead Tracking System) program that tracks the disposition of leads that are sent to the recruiter through NNRIC and NOIC. This office also monitors the response to individual ads and develops a cost-per-lead statistic for every ad. Finally, there are offices within the Recruiting Advertising Department to manage the distribution of recruiting aids (called RAD items) and to promote public service advertising.

Program Areas

The Navy advertising programs are closely alined with the recruiting programs that they support. The first major breakout for recruiting is by enlisted and officer categories. Accordingly, there are general enlisted and general officer programs. Cutting across both of these areas is an ethnicity categorization resulting in minority programs. Enlisted programs are further segregated by programs for the reserve, target audience, women, and occupational specialty. Officer programs are categorized by occupational specialty or source of commissioning, such as the medical and NROTC programs, respectively.

The allocation of advertising funds to major program areas is shown in Figure 2, based on the revised FY 1977 communications plan. Approximately two-thirds of advertising funds go directly into the officer and enlisted programs. The remaining one-third of advertising funds go towards advertising support programs and incidental costs associated with contractual services, such as labor, overhead, and fees. The largest single category of advertising is the general enlisted program with 47 percent of the total budget. Of the direct advertising

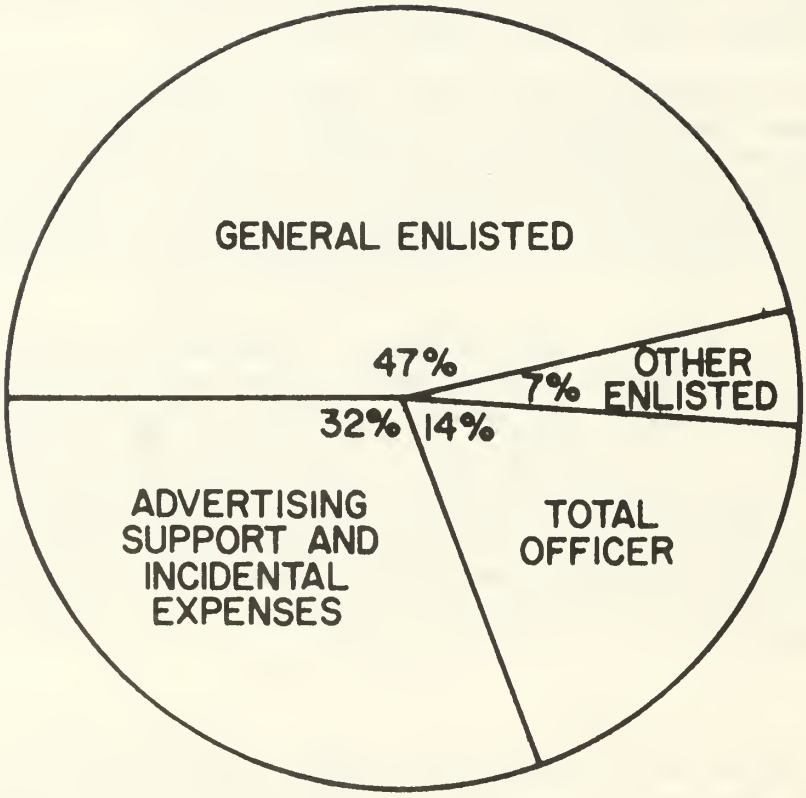

Figure 2

Allocation of Navy Recruiting Resources

to Major Program Areas in FY 1977.

costs, the ratio of enlisted to officer advertising is 4-to-1. The purpose of this research effort is to determine the effectivenevs of that portion devoted to the enlisted programs. Over the existence of the AVF, the enlisted programs have included the following:

Program	Target
General enlisted	18-24 year-old males with emphasis on 18-21 year olds who have graduated from high school, are in the upper half of this group in general mental aptitude, and are mechanically and technically oriented.
Enlisted influentials	Academic teachers, vocational teachers, guidance counselors, and athletic coaches in secondary schools and junior colleges.
Prior service reenlistment	Navy veterans in civilian life less than 4 years from discharge date.
Enlisted retention	Males, 19-25 in ratings E-3 to E-5 who are high-school educated and on active duty.
Veteran reserve	Veterans from the Navy and other services with transferrable skills.
Reserves (Active Mariner and Ready Mariner)	Primary target: as above for general enlisted. Secondary target: other enlistment-qualified individuals. Advertising targeted to both.
Nuclear field/Advanced electronics	As above for general enlisted.

The general enlisted program is an umbrella program addressed to youth in the 18-to-24 year group that encompasses approaches common to all of the enlisted programs. The cornerstone to this approach is a unique selling proposition (USP) that distinguishes Navy jobs from those provided by the chief competitor, the civilian job market. This uniqueness is said to be an extra dimension of adventure, which has been emphasized by the specific USP, "... it's not just a job, it's an adventure." Special advertising is developed to feature incentive programs. As shown above, greatest emphasis is placed on convincing young men in the primary target group that the Navy provides jobs and opportunities that are superior to their civilian counterparts.

The influentials program attempts to build a positive attitude among the target audience towards the Navy as an attractive job and career opportunity so that they will influence 17-to-21 year olds to join the Navy.

The prior-service reenlistment program is designed to create and maintain an awareness and a positive attitude among recently discharged Navy personnel of the opportunities for reentering the Navy.

The enlisted retention program attempts to convince those in the target audience completing their first term to remain in the Navy as a career choice.

The veteran reserve program attempts to build an awareness among the target population of the opportunity to maintain their link with the Navy and maintain and improve their military skills while earning Navy pay and benefits. The program is constrained geographically by the need for reserve, unit-training opportunities in an area.

The reserve programs with an active-duty commitment are allocated only .15 percent of the monies provided for total enlisted advertising. They represent an alternative to a full-term, active-duty commitment and do not differ substantially from general enlisted programs. An exception is the training and administration of the reserve (TAR) program that provides for extended active duty at a reserve activity after a period of initial training in the regular Navy.

Approximately one-half percent of the total enlisted advertising budget is spent on the critical, 6-year obligation programs for the nuclear, advanced electronics, and advanced technical fields. These are the only enlisted occupational areas having a special advertising program. The advertising is very selective with respect to media and copy.

The Navy advertising program can also be considered from a functional orientation. In this perspective, most of the foregoing material can be considered as national media advertising. Other functional categories include the RAD aids program, the local advertising management system (LAMS), and public service advertising.

The RAD aids program attempts to provide materials to recruiters that can be used at the local level as an extension of CNRC's national advertising campaign. To complement the national advertising, RAD aids maintain common copy features and the overall concept of the national umbrella campaign. Since printed items are purchased or produced in large quantity, many of the items may have the USP of previous campaigns. Because most of the major aids are designed for the general enlisted program, they cover areas included in all of the enlistment programs. Nevertheless, aids may be produced to highlight special programs or for emphasis. For example, the booklet, "Navy Training - Civilian Careers," provides a description of the Navy's occupations and relates them directly to the Labor Department's "Dictionary of Occupational Titles" for the benefit of vocational counselors. The booklet, "Navy Campus for Achievement," highlights educational and training opportunities for both officers and enlisted persons. The most popular booklet gives an attractive portrayal of Navy life and opportunities and is requisitioned at a rate of

over 100,000 copies per month by the field (Arima, 1978a). Included among RAD items are a variety of canned or taped radio and TV spots for public service advertising. The cost of recruiting aids is shown by quarters for FY 1976, 1977, and the temporary quarter TQ 1976, in Table 3.

The local advertising, or LAMS, program is designed to permit operators and canvassers in the field to capitalize on local opportunities for publicizing Navy opportunities. In the past, a portion of the advertising budget was earmarked for the LAMS program, and the funds were provided the NRA commanders who further allocated monies to their NRDs according to demonstrated requirements. More recently, NRDs have been required to propose an advertising plan, which is reviewed by the NRAs and at the CNRC level before approval and funding. Typically, the money has been spent on advertising in school newspapers, local sports and rodeo programs, telephone yellow pages, mail outs from local recruitiers, van-mounted mobile display units, taxi-mounted displays, and so forth. Expenditures for LAMS are shown by quarter in Table 3, also.

Finally, there is the public service advertising program, the objectives of which are identical to the paid advertising campaign. At one time, this was the sole source for radio and TV advertising, owing to the Congressional prohibition previously mentioned. Magazines, newspapers, outdoor, and public transit advertising are also solicited. All materials used in the public service program are produced by other activities; the Public Service Division's primary mission is to solicit and maintain lists of media representatives who will provide advertising space or time on a continuing basis. The emphasis placed in the solicitation is that the media would be performing a public service by informing the public of opportunities in the Navy.

Media Utilization

The pattern of utilization of media in the Navy's advertising program during the AVF years has been conditioned by constraints on the use of the electronic media into the following three periods:

Media Constraint	Period (Calendar Years)
No radio or TV	July 1973 to Third Quarter 1976
Radio, no TV	Fourth Quarter 1976 to First Quarter 1977
Radio & TV	Second Quarter 1977 to present

During the first period, media advertising was in magazines, direct mail, outdoor, newspapers, and supplements. Supplements were used in only the second and third quarters of 1976. The inclusion of radio and television changed the distribution of resources among the quarters and among media.

Previous to radio and television, advertising was concentrated in the second and third quarters. After the electronic media became available, advertising resources have been concentrated in the second and fourth quarters. The general policy is that peak advertising should occur

Table 3

Navy Expenditures for Local Advertising (LAMS)

and Recruiting Aids (RAD)

Year	Quarter				Total
	1	2	3	4	
			LAMS		
1976	186,405	426,713	302,799	206,403	1,122,320
1977	260,360	302,520	329,100	441,649	1,333,629
			RAD		
1976	(N.A.)	2,894,921*	1,065,084	2,328,031	6,288,036
1977	2,471,120	4,658,691	820,212	802,164	8,752,187

*RAD expenditures for the first quarter of 1976 were not available (N.A.). The second quarter, however, includes both the first and second quarters.

in the periods April to May and September to November on the premise that the decision time of the primary target occurs prior to graduation in the late spring and mid winter. Advertising for the small retention program is peaked during June, July, and August prior to the beginning of the school year and family moves and decisions are made. The distribution of resources in time is also affected by the characteristics of the media. Magazine advertising has a relatively long effect, since it is hard copy that is retained. Coupons from magazine ads continue to come in for many weeks following the insertion of the ad, and it is not unusual for some to arrive several months later. On the other hand, time for network and syndicated television programs must be purchased well in advance. Obviously, in contrast to hard copy, the life of one presentation on TV is ephemeral. Thus, large-scale utilization of television tends to structure advertising, and it must be programmed well in advance.

The distribution of resources over media is shown in Table 4 by quarters selected for their comparability, proximity in time, and representativeness of the three periods in media utilization. To expand on the relative amounts obligated to the use of the media shown in the percentages of Table 4, policies and practices with respect to the utilization of individual media will be noted. Network and syndicated television is used as a secondary medium to capitalize on the sight, sound, and motion that the medium provides to convey the advernture theme. Other considerations are its broad reach and increased exposure to influentials.

Paid radio is utilized because of its fast reach and frequency of impact. It provides flexibility, a minimum lead time, and considerable target selectivity. For example, the veteran reserve program can be limited to the urban centers where recruiting for the program occurs. The Armed Forces Radio-Television Service (AFRTS) is used in overseas areas, especially for the retention program.

Magazines provide an opportunity for a continuous, 12-month program that transmits detailed copy. As stated above, magazines are hard copy and durable. Magazines also provide reasonable target selectivity--e.g., counselors through professional journals--and lead generation by inserted pop-up cards or on-page coupons. The latter cost much less, and some even believe that the effort and cost required to cut out and mail the coupon is a screen for the overly casual or crank respondent.

Direct mail is an especially versatile medium because it permits the most specificity and segmentation of the target audience--e.g., this year's graduating seniors in predominantly black high schools. Direct mail also has a good lead generation capability through mail-back postcards, any desired amount of detail can be presented (although it may not be read), and it is used in an intrinsically action-oriented approach, rather than the awareness or attitude orientation of other media. The veteran reenlistment program is carried out with direct mail as the major vehicle. It is also an important medium for the retention program.

Table 4

Distribution of Media Advertising Dollars with and without Radio and Television

Media	3rd Quarter 1976	1st Quarter 1977	4th Quarter 1977
Television	----	----	898,328 (47)
Radio	----	343,993 (34)	591,807 (29)
Magazine	808,460 (55)	463,497 (46)	161,957 (09)
Direct Mail	32,256 (02)	143,357 (14)	290,309 (15)
Outdoor	579,488 (40)	31,462 (03)	----
Newspapers	3,202 (0.2)	20,883 (02)	----
Supplements	41,624 (03)	----	----
All Media	1,465,030 (100)*	1,003,192 (100)	1,912,401 (100)

*Numbers in parentheses are percent of total media expenditures for the quarter. They may not sum to 100 due to rounding.

Newspapers and supplements are used sparingly at the national level. Navy base papers and the Navy Times are used in the reenlistment program, and metropolitan dailies are used in selected areas for the veteran's reserve program. In other cases, newspapers may be used to try to rectify shortages in critical occupational areas.

Outdoor advertising is used fairly extensively, as Table 4 shows, for rather limited purposes. While outdoor advertising has temporal stability, its problem is unique in that the viewer is usually in rapid motion. Accordingly, very little information can be transmitted. In the Annheuser-Busch studies, for example, outdoor advertising was completely curtailed when it was learned that the viewing time was just a matter of seconds and that the average person was exposed to the words, Annheuser-Busch, some 10 or 11 times a day. There was no basis, it was reasoned, for adding another similar occasion to an already very frequent event. In the same vein, the Navy uses outdoor advertising as a supporting medium in top Navy recruiting markets to reinforce the message of the USP. Outdoor advertising can provide broad coverage, and it can be used in a reminder role, such as on or near Navy bases as a link to the career counselor in the reenlistment or retention program. Its use in the retention program and the advantage of good weather make outdoor advertising a mid-year project. Its area specificity also makes it useful for the veteran's reserve program.

Objectives of Navy Advertising

The communications plans of the Recruiting Advertising Department, in presenting the various programs, relates each to the marketing objectives for the program. There is the implicit intent that the advertising program should contribute toward the attainment of the marketing objectives, since advertising is a part of the marketing plan. In addition, the communications plans list advertising objectives separately for the various programs. Inspection of the marketing and advertising objectives over the years suggests that there is not always a clear distinction between the two. In one plan, "deliver stronger, more motivating copy" is listed as a marketing objective, and "build a stronger motivation toward Navy enlistment" is listed as an advertising objective, while in a different plan, "establish long-term positive attitudes towards the Navy" is included as a marketing objective. In one plan, increasing traffic at the recruiter level is listed as a marketing objective, and in another plan, it is listed as an advertising objective. In addition to the marketing and advertising objectives, other objectives slip into the communications plan through sections such as those listing creative objectives and strategies. It seems, however, that some overall objectives of Navy recruiting advertising are to have a positive effect on the attainment of recruiting goals, create a long-term positive attitude toward the Navy, and to increase traffic at the recruiting-station level. Another that might be included in this overall hierarchy is to generate leads.

The advertising objectives listed in the revised FY 1977 communications plan for the general enlisted program are quite comprehensive and representative of listings in other plans and sections of plans. The listing is preceded by a statement that the objectives are to be achieved by building a greater awareness of, and positive attitudes toward, the Navy. Whether either or both are necessary or sufficient for attaining the objectives is, as explained previously, open to question and a matter for research. The list of specific objectives follows:

1. Greater walk-in traffic at the recruiting station.
2. More favorable response to a recruiter's telephone call.
3. Increased calls to the toll free number.
4. More leads generated to NOIC.
5. Greater discussion among influentials.
6. More favorable reception to recruiter's request to visit groups.
7. Increased dialogue between prospect and recruiter.
8. Better understanding of Navy benefits.
9. Greater receptivity to direct mail solicitations.
10. Greater respect for the Navy recruiter within the community.
11. Increased self-esteem among the field recruiters.
12. The understanding by the prospect that jobs and careers in the Navy are more rewarding than most civilian jobs.

The advertising objectives for the special programs are generally to create awareness of and a favorable attitude toward the programs. In terms of the discussion on problems in evaluating advertising, the advertising objectives as stated are the presumed mediators of the ultimate objective--attaining the required numbers and quality of recruits. Even the action objectives, such as walking into a recruiting station, calling the toll-free number, or sending a coupon to NOIC, are one important step short of the desired action of signing a enlistment contract.

PROBLEMS IN EVALUATING THE EFFECTIVENESS OF NAVY RECRUITING ADVERTISING

The problems that will be faced by the researcher or analyst who attempts to evaluate the effectiveness of Navy advertising will duplicate many of the points made previously with respect to advertising in general. Only the setting and specific issues may be different. There will be the overriding problem caused by the multiple determination of recruiting production, the need to choose among methodological approaches and levels of evaluation, and limitations in the available or collectible data.

Multiple Determinants of Personnel Acquisition

The determinants of production by the recruiting force--i.e., the bottom line--are many. They can be divided into sources that are associated with the recruiting and personnel procurement effort, itself, and those generated by temporal and environmental factors outside the control of the recruiting effort. These will be referred to as internal and external factors in the sense that economists use the labels endogenous and exogenous sources. When such a complex phenomenon as recruiting production is categorized by two source variables, the interaction of the two must also be considered as another possible source. That is, the effect on recruiting of one of the endogenous variables might depend on the presence or absence of one of the exogenous variables.

Internal Determinants of Productivity

As plans mediated the levels of both sales and advertising in civilian enterprise, goals will be found to perform a similar role in the Navy's recruiting advertising. Thus, accessions, rather than reflecting advertising, may be dictated by goals. During a period when goals act as a lid on recruiting, the number of recruits attained will be a direct result of the goal, and any amount of advertising will not increase numbers of persons being recruited. Using a Marine Corps example, knowledge of recruiter man months at a recruiting station predicted recruiting station output with a correlation in excess of .99 (Sullivan, 1976), since goaling was also directly related to available recruiter strength. When the system is in equilibrium, goals, a population parameter, recruiter strength, and recruiter production should predict each other equally well and to a high degree, leaving little room for the effects of other factors.

Changes in qualitative requirements may also have a profound effect on production. For example, towards the end of the first year of the AVF (FY 1974), goals were increased sharply, but production in total numbers was attained by a drop in the quality of recruits (Arima, 1976). On the other hand, the requirements for high school graduates was raised at the start of FY 1978 as a means of controlling the attrition rate, since the probability of a diploma, high-school graduate finishing a term of service is considerably better than that of a

high-school dropout. After the new requirement, however, production declined in succeeding months, sometimes at a dramatic rate.

For whatever reason, the Navy Recruiting District was found by Arima (1978b) to be a significant determinant of recruiter productivity, and Brown, Wood, and Harris (1975) found that the one best predictor of Army recruiter productivity was the average rate for the recruiter's district. As the basic management unit in the field, this finding regarding the districts probably reflects a combination of management prerogatives and practices, in addition to external factors. For example, the assignment of resources and goals to districts may not be equitable, considering territorial factors conductive to recruiting. It may also reflect the capabilities of the staff, and especially those of the commanding officer of the NRD.

Finally, recruiter effort and capability are also important factors in determining production. Arima (1978b) found that the recruiter accounted for some 35 to 40 percent of the variability in production among recruiters. When aggregate measures of productivity are used, such as for the station or NRD, the individual recruiter is no longer a variable in the analysis but contributes significantly to noise in the data.

In addition to these factors directly associated with the recruiting effort, there are other activities that form a part of the overall marketing plan. Under the aegis of the Advertising Support Department of CNRC, many promotional activities are sponsored or carried out. These include the Sea Power lecture series, the Blue Angels flying team, solicitation of the support of local Navy-related organizations such as the Navy League, sea tours, sponsored tours to Navy installations, and an educational liaison program. Close coordination and integration of these activities exist with the Navy's public information program.

Incentives in the form of choice of coast, buddy enlistment options, the enlistment of an entire local group to be trained together initially, and other incentives are created from time to time. Individuals who are in the delayed enlistment program (DEP) and waiting for their active duty entry may be advanced one grade for inducing friends to enlist, thus giving the person more money from the first day of service. A complicating factor is the use of advertising to publicize these opportunities. How much of the effect, if any, is due to the specific incentive and how much to the advertising?

The enlistment programs or options--the items being marketed--are also important determinants of enlistment decisions. As of this writing, the choice fields involving high levels of training--advanced electronics, nuclear, medical technology, advanced technical field--require a six-year obligation. If they were cut to four, what would be the difference? At one time, there was a three-year enlistment option, now the shortest enlistment (excluding reserve categories) is for four years. Enlistment options can be configured in other ways

than by length of service obligations. All of these programs are heavily advertised--for example, under the overall Navy Campus for Achievement (NCFA) program (Arima, 1978a). Some part of the success of the programs, if any, must be due to the nature of the options offered and also the manner in which they are advertised.

These and other aspects of the recruiting, marketing, or staffing program--generally termed personnel acquisition in the Navy--all contribute to an individual's decision to enlist. To isolate the effects of advertising from them, is a formidable effort. But this is merely a listing of the internal factors.

External Determinants of Productivity

There are many external factors that have been examined for various reasons. The distribution and allocation of recruiter and other recruiting resources, the goaling of recruiting units, and the content and targeting of advertising and promotions may be some of the purposes for examining them. Depending on the methods of examination, the time period in which the examination took place, the particular sample, and the level of examination--individual or aggregated, some factors have been found to have a significant effect in one study and then no effect in others. Rather than reviewing this extensive literature in detail, typical examples will be listed. Economic variables, such as employment opportunities, family income, and wage rates in an area, have been given much consideration. Demographic and social variables have also been used, such as workforce composition, age distribution of the population, ethnic profile of a community, and population density. The impact of a military presence (bases) in an area has been hypothesized as having both facilitative and detrimental effects on recruiting. The competition of recruiting advertising by the other services may be an important factor. Educational characteristics are another dimension and have included the presence or absence of different types of institutions, proportion of students who finish high school, quality and availability of vocational education, pattern of continuation into post-high-school educational paths, and the position of an area on standardized tests. Finally, there has been a large number of studies trying to identify the attitudes, desires, and propensities of individuals for enlisting in the military services. Any one of these factors or any combination thereof may have differential effects on the success of recruiting in a particular area.

One way to handle this seemingly endless list of potential sources of effects on recruiting productivity is to ignore them and treat them as random variables. Obviously, this would then necessitate large samples in order to provide enough degrees of freedom for a small advertising effect to be detected. One potential source of problems due to the numerosity of factors is their colinearity, but this can also be an advantage that can be exploited by reducing them to a few underlying factors. These considerations, however, are more appropriate to a discussion of methodological approaches and data requirements.

Methodological Considerations

Perhaps a highlight of the continuing effort to develop means for evaluating Navy advertising effectiveness was a one-day seminar on "recruiting resources allocation and recruiting advertising impact" held in Alexandria, Virginia, on 30 January 1978 under the sponsorship of the Office of Naval Research. Since the leading proponents of the various approaches to evaluating advertising effectiveness were represented at the seminar, each of the approaches received its share of support. In general, the recommendations included those for controled experiments, the regression approach, modeling and optimizing the recruiting and advertising processes, and individual consumer behavior research. No consensus was reached or really sought. The problems and possible approaches were aired, and they repeated the arguments in the civil sector. Thus, the approach that will be taken will depend on the orientation of the researcher, and no one method has to be chosen to the exclusion of other approaches. In view of the Navy's expressed desires for effectiveness research, there was emphasis on means for evaluating the role of advertising with respect to recruiting production, rather than some intermediate criterion.

Accordingly, this study effort will adopt a regression approach for several reasons. First, because it is exploratory, it would appear sensible to examine the situation with available historical data. This approach would help to identify the variables that affect recruiting production and may even provide some indication of advertising's effects on production. Control experiments could profit greatly from such an exploratory study with respect to the variables that must be controlled, randomized, or parameterized; the levels of the experimental, expenditure variable to be used; and the appropriate duration of the experiment. In addition to these reasons, difficulties in executing a controlled experiment are greater than those for a regression study. These difficulties lie in the potential reactivity--and resulting bias--of the recruiting organization and personnel to the experimental manipulations, the need to control the influence of several advertising media that operate simultaneously, the need to obtain other-service cooperation to control for service advertising levels in any area, and the need to continue the experiment for a sufficiently lengthy period to permit stabilization of production at the experimental support levels.

Data Availability

Given the decision to evaluate the Navy's advertising effectiveness using currently available data, it was necessary to determine what data were available. Generally, the immediately available advertising data were at a relatively high level of aggregation. Accordingly, while it was possible to create production files using

information at the individual recruit level from the Enlisted Master Record (EMR), a more aggregated source of production was sought. Unfortunately, almost all recruiting production data relate to shipments to the Recruit Training Centers (RTC). This, of course, is the ultimate bottom line of the recruiting system, but it is a poor indicator of enlistments because the individuals shipped could have enlisted at any time up to one year prior to the shipment date under the delayed entry program (DEP). A recruiting production category reflecting the enlistment data is contracts signed. This information was available beginning in July 1976 in terms of the average number of new contracts signed per canvasser per month by NRD. Accordingly, references henceforth to "contracts signed" will be to this data source.

Data relating to national advertising programs were available in several forms. The first category was a record of leads generated by coupons and the WATS numbers. A running record of leads received is kept for each ad insertion, and a cost-per-lead datum is available for each ad. A lead trackings system (NALTS) monitors for 60 days the outcomes of a sample of leads that have been referred to recruiting stations. These data more-or-less speak for themselves. They could be important for evaluating copy, consumer segments, and publications (individually and by classes). However, they were not considered to be useful for the analyses contemplated.

Data for national advertising were also available in the form of total expenditures per month at a national level by media and major program category--e.g., general enlisted. These data were aggregated at such a high level that they could not be used to evaluate advertising effects at an operational level of recruiting, such as the NRD. In addition, evaluation of advertising at an aggregated, national level would be difficult because of the simultaneity problem involving managerial decisions on the seasonality of recruiting and the shipping schedules based on projected training facilities. That is, the training pipeline determines the flow, variations in the flow depend on ideas of the seasonality of recruiting, and both advertising and production are determined by these considerations. Any relationship found between advertising and production under these conditions would tend to be spurious. Considerations such as these made it unlikely that the national advertising data could be used to any advantage.

Expenditures for the LAMS program and dollar equivalents of RAD items requisitioned were available at the NRD level aggregated by quarter.

This picture of available data was not encouraging. An attempt was made to relate production at the NRD level to the available advertising data with highly indeterminate results. The available data were supplemented with self-report data available from the twice-yearly, youth attitude tracking studies conducted for the Department of Defense by Market Facts, Inc. An analysis of these data confirmed the importance of attitudes and certain demographic variables on the professed propensity

to enlist and the reported, self-initiated contacts with Navy recruiters (Rhodes Associates, 1978). They were inconclusive with respect to the effects of advertising awareness measures or the limited data on LAMS and RADS expenditures (Table 3).

The limitations in the data were brought to the attention of the Navy Recruiting Command, and arguments were made for more detailed data showing the distribution of national media advertising. The Recruiting Command then let a contract with its agency, Ted Bates, Inc., to break out all national advertising in several program categories to the county level by month for calendar years 1976 and 1977. Completion of this work effort made possible the analysis in the second part of this report.

PART II. EMPIRICAL STUDY

THE RELATIONSHIP BETWEEN ADVERTISING RATES AND ENLISTMENT RATES IN THE NAVY

METHOD

Approach

In order to take advantage of the allocation of national media advertising expenditures to counties in the study by Ted Bates (1978), the county within the continental United States was taken as the unit for analysis. This required the reallocation of quarterly LAMS and RAD expenditures at the NRD level to counties in monthly increments. When this was done, information representing all Navy advertising expenditures was available for each of over 3,000 counties by month for 1976 and 1977. The advertising data were then supplemented by variables reflecting management practices, such as the allocation of canvassers to counties, and the population characteristics of the county that were thought to have the most impact on the production of recruits. Finally, based on the record of all individual accessions to the Navy in 1976 and 1977, the number of new, first-term, male recruits was determined for each county by month. Using the recruiting data as the dependent variable, an ordinary least squares (OLS), multiple regression model was fitted to the data. Advertising lagged by one and two months, as well as current advertising, was used in the analysis. The details of this approach are explicated in the material that follows.

Data Sources and Basic Study Variables

Advertising Data

The Ted Bates agency provided data on the Navy's expenditures for national media advertising programs by county and month for calendar years 1976 and 1977. Only data for the general enlisted program were used in this study. The media included television, radio, magazines, direct mail, outdoor, newspapers, and supplements. As previously stated, paid radio advertising did not begin until November 1976 and television, not until April 1977 because of Congressional prohibitions against the use of paid advertising in the electronic media. The national, monthly distribution of advertising expenditures over the media is shown in Table 5.

The television dollars per county for a particular program were calculated by first using A. C. Nielsen impressions per station for men 18-34 years old, determining the proportion of all impressions achieved by each station, and prorating the costs of the program to each station on this basis. The station dollars were then assigned to counties in proportion to each county's average viewing hours of the station based on periodic Nielsen county-coverage studies. The county program dollars were then summed by month for each county.

County dollars for network radio programs were determined in a similar manner using ARB (Advertising Research Bureau) impressions per station and distributing station dollars to counties using the Pulse,

Table 5

MONTHLY MEDIA EXPENDITURES*

YEAR	MONTH	TOTAL	MAGAZINE	MAIL	TELEVISION	RADIO	OUTDOOR
1976	Jan.	232,952	102,954	129,998			
	Feb.	149,256	62,668	86,588			
	March	155,366	143,573	11,792			
	April	381,564	295,914	85,650			
	May	409,182	151,165				258,017
	June	536,529	261,301				275,228
	July	513,370	235,726				277,644
	Aug.	494,833	214,495				280,338
	Sept.	283,165	261,009	650			21,506
	Oct.	223,659	223,009	650			
	Nov.	515,880	133,115	192,485		190,280	
	Dec.	20,615	19,965	650			
1976	Total	3,916,371	2,104,894	508,463		190,280	1,112,733
1977	Jan.	392,297	168,545	142,016		81,737	
	Feb.	297,700	133,650	650		163,400	
	March	192,603	109,686	650		82,267	
	April	854,072	36,686	128,208	288,306	112,574	288,299
	May	1,020,599	31,648	650	400,594	299,119	288,588
	June	368,934	4,013	675	128,801	235,271	174
	July	314,151		675		313,248	229
	Aug.	246,065	2,639	675		242,577	174
	Sept.	317,613	3,887	675	188,973	124,079	
	Oct.	1,111,848	51,978	253,070	495,634	311,166	
	Nov.	672,273	18,679	675	402,693	250,226	
	Dec.	15,514	14,838	675			
1977	Total	5,803,669	576,249	529,294	1,905,001	2,215,664	577,464

*Excludes newspaper and supplements, which were not a part of the general enlisted program.

male listening audience figures for stations by county. Program dollars for new stations not in the Pulse calculations were attributed directly to the county in which the station was located. This procedure was also used for spot broadcasts.

The ABC (Audited Board of Circulation) state and county data bank of audited circulations was used to assign magazine dollars to counties in 52 percent of magazine advertising. The other 48 percent was estimated from state circulation data provided by ABC or obtained directly from publishers and then prorated to counties on the basis of 1977 population statistics provided by Sales Management, Inc. Dollars were distributed directly into the county of origin in limited-distribution advertising situations, such as programs for special events.

Dollars for outdoor advertising were taken from the VCS (Visual Campaign Summary) market data and prorated to counties on the basis of QMA (Qualified Male Availables)[1] in the counties within each VCS market summary.

Direct mail dollars were estimated by using a typical mailout in 1977 to determine the number of mailouts by zip code. A tape provided by ZIP-O-Data was used to assign the zip-code data to counties. The exact dollars by county for each mailout were then obtained from the direct-mail distributor.

Newspaper and supplement advertising was assigned to counties using ABC data or circulation information obtained directly from publishers in a manner similar to magazine advertising.

In order to reallocate the LAMS and RAD expenditures which were provided by the Navy Recruiting Command for the 43 NRDs by quarter, it was first necessary to track the fluctuating mapping of counties to NRDs. This was done for the entire period from January 1976 through December 1977. The NRD dollars for LAMS and RAD were then assigned to the constitutent counties in proportion to their QMA. The quarterly amounts were then divided equally into the three months making up the quarter, except for the first six months of 1976, when they were divided into six equal, monthly statements.

The foregoing operations provided an assignment of all Navy advertising dollars for the general enlisted recruiting program to each of 3,074 counties over a two-year period by month.

Recruiting Data

The key recruiting variables were those for goals, accessions, canvassers, and the county population base. Goals were for first-term, male (QUEBEC or Q) enlistees. The population base was a

[1]The QMA is discussed below in conjunction with the description of recruiting data used in this study.

second (1977) revision of the county-level QMA which was provided by the Defense Manpower Data Center (DMDC).[2] The QMA was constant for all 24 months of the study. Goals and canvassers were obtained for each NRD from the monthly recruiting summaries of the Navy Recruiting Command. They were prorated to counties within each NRD on the basis of the QMA. National monthly goals and canvasser strengths are shown in Table 6.

Appropriate accession figures proved to be difficult to obtain, since the usual accession figures reflected shipments to the Recruit Training Centers (RTC). While such accession figures are the bottom line for the recruiting system and of the utmost importance to its management, they are inappropriate to use as enlistment figures for research in recruiting because those being shipped could have actually enlisted up to one year previously in the delayed entry program (DEP), where the majority of shipments to the RTCs originate. What was needed was a "contract signed" date to identify the act of enlisting. This was obtained from the individual, enlisted master record (EMR) tapes by DMDC using the pay entry base data (PEBD), appropriately edited. All first-term, male enlistees with pay entry base dates in 1976 and 1977 were identified by date of enlistment, county of origin, number of years of education completed (high school graduation), and AFQT (Armed Forces Qualification Test) score. They were then aggregated by county and month according to total Q enlistments, enlistments of high school graduates, and enlistments of recruits who were high school graduates and had AFQT scores in the upper half of the AFQT distribution.[3] National monthly enlistments in these categories are shown in Table 7.

Situational Data

The number of high school graduates in each county for 1976 was obtained from DMDC and used as a measure to partially validate the revised QMA statistics and also to provide an indicator of the quality potential of a county, since high school graduation is one of the two most important screening variables for Navy recruiting. The 1976 figure was used as a constant for the entire 24 months of the study period.

---

[2]The QMA data were originally compiled for each county using the 1970 census of males aged 17-24 years, inclusive. This figure, the military availables (MA), was adjusted for each county on the basis of empirical qualification rates for general, military service to result in qualified military availables (QMA). It was revised in 1976 on the basis of birth and death rates, population migration statistics, and more current qualification data. It was again revised in 1977 to reflect more accurate acceptance rates.

[3]The category of enlistees who were high school graduates and had AFQT scores at or above the 50th percentile will be identified as GRAD50 enlistees and may be referred to as "quality" enlistees. "Total enlistments" refers to first-term male enlistees and may be referred to as QUEBEC or "Q" enlistees.

Table 6

MONTHLY Q GOAL, CANVASSERS, AND UNEMPLOYMENT

YEAR	MONTH	Q GOAL	CANVASSERS	UNEMPLOYMENT PERCENTAGE
1976	Jan.	5,953	3,241	19.9
	Feb.	4,943	3,236	19.2
	March	4,631	3,215	19.1
	April	4,293	3,178	19.2
	May	4,935	3.147	18.5
	June	7,765	3,158	18.4
	July	9,500	3,179	18.1
	Aug.	9,500	3,236	19.7
	Sept.	9,500	3,266	18.6
	Oct.	7,992	3,221	19.0
	Nov.	6,216	3,247	19.0
	Dec.	4,688	3,222	18.9
1976	Total	79,916	3,212*	19.0*
1977	Jan.	7,249	3,229	18.7
	Feb.	5,302	3,258	18.5
	March	4,775	3,266	18.8
	April	4,275	3,303	17.8
	May	4,775	3,336	17.9
	June	8,552	3,362	18.6
	July	9,795	3,382	17.4
	Aug.	11,442	3,495	17.5
	Sept.	11,083	3,477	18.1
	Oct.	6,375	3,420	17.3
	Nov.	5,061	3,392	17.1
	Dec.	3,836	3,395	15.4
1977	Total	82,520	3,360*	17.8*

*Yearly totals for these categories are averages of the preceding 12 months.

Table 7

MONTHLY FIRST-TERM (Q) ENLISTMENTS

YEAR	MONTH	TOTAL ENLISTMENTS	HIGH SCHOOL GRADUATES	GRADUATES ABOVE 50TH %
1976	Jan.	9,021	5,834	4,175
	Feb.	7,897	5,114	3,765
	March	8,138	5,612	4,218
	April	6,666	4,650	3,471
	May	5,834	4,209	3,131
	June	7,067	5,553	3,813
	July	7,531	5,691	4,173
	Aug.	7,761	5,886	4,346
	Sept.	8,207	5,927	3,991
	Oct.	7,891	5,459	3,612
	Nov.	9,098	6,132	4,449
	Dec.	16,457	11,291	8,147
1976	Total	101,568	71,358	51,309
1977	Jan.	7,025	4,703	3,194
	Feb.	7,191	4,651	3,172
	March	7,764	4,990	3,489
	April	6,332	4,073	2,886
	May	5,900	3,818	2,738
	June	7,633	5,154	3,461
	July	7,852	5,213	3,483
	Aug.	8,677	5,616	3,809
	Sept.	7,443	4,374	2,989
	Oct.	5,951	3,741	2,651
	Nov.	6,927	4,033	2,904
	Dec.	6,861	3,836	2,719
1977	Total	85,556	54,202	37,495

The Department of Labor's national, monthly unemployment rates for youths aged 16-19 years were used as a gross indicator of unemployment trends and assigned to all counties. These rates are shown in Table 6.

Data Summary

In summary, the basic unit for this study was the county. All expenditures for advertising programs by media, important recruiting management and production data, and two qualitative indicators--high school graduates and unemployment rate--were obtained or calculated for each county. Where the available data were not directly assignable to counties, an appropriate and available basis was used to prorate the data to the counties. This was done for each month in the two-year period and resulted in a total of 73,776 counties-by-month cases.

Data Refinement for Analysis

Outliers

There were three sources of outliers in the data. The first of these can be seen by an examination of Table 7, where the enlistments for December 1976 are more than twice that for December 1977 and for the average of the preceding 11 months of 1976. This phenomenon was a manifestation of the cessation of Veteran's benefits for persons enlisting after the end of December 1976. This event probably influenced some enlistments in November 1976 as well, but the effect is not as pronounced. For example, enlistments in November 1976 were approximately equal to those in January 1976. Accordingly, only data pertaining to December 1976 were eliminated from the analysis.

The second and third sources of outliers were due to the smallness of some counties. This resulted in many county-month cases where there were no enlistments. The effect was greater for the quality (GRAD50) enlistees. This situation could be expected with 3,000 counties and a monthly Q enlistment rate of less than 8,000 for the entire recruiting command during the two-year period. Leaving in the county-month cases with zero enlistments resulted in distributions that were excessively peaked and bimodal. Accordingly, zero-enlistment county-months were deleted from the analysis of both total enlistments and the GRAD50 enlistments.

When, as will be explained later, the enlistment data were normalized for the county QMA, the distribution showed a lengthy, positive tail of cases with exceptionally high rates. Again, it was apparent that these cases were also due to the smallness of the counties. That is, when a very small county experienced several enlistments in a single month, the rate was exceptionally high. A cummulative frequency distribution of total monthly enlistments per QMA is provided in Table 8.

Table 8

DISTRIBUTION OF TOTAL MONTHLY ENLISTMENTS PER QMA

INTERVAL	FREQUENCY	CUMULATIVE FREQUENCY
Less than .0005	7,973	23.6
.0005 to .0010	11,936	58.8
.0010 to .0015	6,083	76.8
.0015 to .0020	2,979	85.6
.0020 to .0025	1,586	90.3
.0025 to .0030	1,065	93.4
.0030 to .0035	649	95.3
.0035 to .0040	402	96.5
.0040 to .0045	281	97.4
.0045 to .0050	221	98.0
.0050 to .0055	158	98.5
.0055 to .0060	116	98.8
Greater than .0060	408	100.0

The 682 county-month cases where the rate exceeded .005 enlistments per QMA were deleted from the analysis as outliers. These 682 cases represented two percent of the cases that had enlistments during a given month.

As a result of the foregoing operations, of the original 73,766 county-month cases, 33,175 remained for the total enlistments category, and 22,844 remained for the GRAD50 quality enlistments category. Thus, the analyses that will be conducted are for the rate of enlisting, given that enlistments have taken place. The question remains as to whether there are other characteristics that distinguish the deleted county-month cases, other than their smallness. A comparison of the two outlier categories with the cases included in the study is made in Table 9 on important study variables. It is very apparent that smallness is the characteristic that distinguishes the outliers from the included cases, especially with respect to the excessively high rates of enlisting. All of the other variables, with the possible exception of national media advertising, are essentially identical for all categories. The national media rates are the smallest for the zero-enlistment cases and increase progressively for the cases included and the excessive-rate cases. The possible significance of this characteristic must await further analysis of the data before it can be evaluated.

Created Variables

Two summary advertising variables were created. One was the sum of all national media (excluding newpapers and supplements) used for the general enlisted program, and the other was a sum of the total national media, LAMS, and RAD expenditures. The first will be referred to as total media, and the latter, total advertising. In order to evaluate the continuing effects of advertising, the variables defining total advertising, total media, LAMS and RAD were lagged for one and two months. Exploratory analysis showed that there would be no significant relationships between advertising and total enlistments beyond the two-month period. Lagging the advertising variables also meant that only 22 months could be studied for variables lagged one month, and only 21 months could be studied for those lagged for two months. Thus, reduction in sample size was also a tradeoff to be considered in lagging the advertising variables. Finally, the effects of lags cannot be evaluated fully for the LAMS and RAD variables, since a single original value for a quarter was spread over three months. Therefore, these variables lagged one month were the same as two current-month values; lagged two months, they were the same as one current-month value. This situation would tend to underestimate the lagged effect of LAMS and RAD.

A dummy variable was created to account for the apparent differences in 1976 and 1977 in the distribution and total amounts of advertising expenditures. The dummy took a value of 1 for 1976 and a 0 for 1977.

Table 9

COMPARISON OF CASES INCLUDED IN THE STUDY WITH EXCLUDED OUTLIER CASES*

VARIABLE	CASES INCLUDED	CASES EXCLUDED	
		ZERO ENLISTMENTS	EXCESSIVE ENLISTMENTS**
QMA	7851 (19507)	928 (1091)	376 (394)
High School Graduates	1798 (4181)	237 (224)	128 (131)
Goals/QMA	.00053 (.00021)	.00054 (.00021)	.00054 (.00020)
Canvassers/QMA	.00026 (.00005)	.00026 (.00005)	.00029 (.00005)
Media/QMA	.028 (.061)	.026 (.043)	.029 (.078)
LAMS/QMA	.008 (.006)	.009 (.006)	.009 (.006)
RAD aids/QMA	.049 (.038)	.049 (.037)	.050 (.033)

*Table entries show the mean, above, and the standard deviation, below (in parentheses).

**Cases with enlistments/QMA equal or greater than .005.

The QMA for the county was multiplied by the unemployment rate to create the number of unemployed QMA in the county.

A canvasser's per goal variable was also created to account for possible differences in the work effort required to produce the goal.

The original and created variables are shown in Table 10 with their means and standard deviations.

Normalization and Transformation of Variables

The simultaneity problem is not unique to the civilian sector. In Navy recruiting, a primary management function is to allocate goals and resources in a manner that ensures that the effort necessary to produce a recruit is equitable throughout the organization (Arima, 1978). The basis for accomplishing this is the target population (basically, the QMA) in a command or unit. Accordingly, resources, goals, production, and the target population should all be highly intercorrelated. The resources could include advertising. Table 11 shows the correlations among enlistments, advertising, goals, canvassers, QMA, high school graduates, and unemployed QMA. Obviously, the assertion is confirmed by the generally high intercorrelations evident in Table 11. A modification was necessary to eliminate the underlying mediator of the correlations. This was accomplished by using the QMA as a normalizer for the enlistment and advertising variables, including all of the lagged variables. The correlations among the normalized variables is shown in Table 12. The actual unemployment rate (UNEMP) was used in this table.

Unfortunately, dividing by the QMA exaggerated the nonnormality in the variables and differences in the shapes of the distributions among the variables to such an extent that it was obvious that a linear model could not be fitted to the normalized data. A transformation that took the fourth root of the advertising variables before normalizing by the QMA corrected this problem. These will hereafter be referred to as transformed variables and will be identified by a "4" inserted in their code names. The code names for data processing and the overall means and standard deviation of these normalized and transformed variables are given in Table 13. A comparison of the ratio of standard deviations to means in Table 13 with the raw measures in Table 10 will show the great improvement in the data for the fitting of a linear, least squares model.

The correlations among the key recruiting, advertising, and situational variables after transformation and normalization are shown in Table 14. There it can be seen that the pattern of correlations is considerably different from the pattern in Table 11. There is not the evidence of management controls when the variables are normalized by the QMA, which is the primary tool of management. The uniquely high correlation in the table is total advertising with total enlistments. Examination of the other advertising variables showed

Table 10

SUMMARY OF VARIABLES IN THE ENLISTMENT MODELS

VARIABLE DESCRIPTION	REGRESSION NAME	MEAN	STANDARD DEVIATION
Total Enlistments	TOTENL	5.1	11.1
Graduate Enlistments above 50th %	GRAD50	3.5	6.3
Total Media Advertising	TOTMED	283.2	1058.0
Total LAMS	TOTLAM	66.1	210.7
Total RAD aids	TOTRAD	390.4	1799.3
Total Advertising	TOTAD	739.8	2676.1
Q Goal	GOAL	4.3	11.6
Number Canvassers	CANV	2.0	5.0
Canvassers per Q Goal	CANGOL	0.5	0.2
QMA	QMA	7971.1	19673.1
Number High School Graduates	GRAD	1818.5	4210.1
Number Unemployed QMA	UNEMQM	1452.8	3590.5

Table 11

CORRELATION AMONG VARIABLES REPRESENTING RAW DATA

	TOTENL	TOTMED	TOTLAM	TOTRAD	TOTAD	GOAL	CANV	QMA	GRAD	UNEMQM
TOTENL	1.00	.66	.74	.52	.67	.91	.93	.92	.93	.93
TOTMED		1.00	.64	.56	.82	.66	.72	.74	.71	.73
TOTLAM			1.00	.47	.65	.76	.81	.83	.80	.82
TOTRAD				1.00	.93	.49	.58	.62	.59	.62
TOTAD					1.00	.65	.74	.77	.74	.77
GOAL						1.00	.93	.92	.90	.92
CANV							1.00	.98	.96	.98
QMA								1.00	.97	1.00
GRAD									1.00	.96

Table 12

CORRELATION AMONG VARIABLES AFTER NORMALIZATION

	ENLQMA	MEDQMA	LAMQMA	RADQMA	ADQMA	GOLQMA	CANQMA	GRADQM	UNEMP
ENLQMA	1.00	.01	.05	.00	.01	.05	.10	.33	.01
MEDQMA		1.00	.03	.04	.86	-.04	.02	.05	-.01
LAMQMA			1.00	-.15	.02	.13	.24	.00	-.18
RADQMA				1.00	.54	-.20	.02	.01	.19
ADQMA					1.00	-.12	.05	.04	.08
GOLQMA						1.00	.39	.07	.11
CANQMA							1.00	.10	-.07
GRADQM								1.00	.00

Table 13

SUMMARY OF VARIABLES AFTER NORMALIZATION AND TRANSFORMATION

VARIABLE DESCRIPTION	REGRESSION NAME	MEAN	STANDARD DEVIATION
Enlistments/QMA	ENLQMA	.0011	.0009
Graduate Enlistments above 50th %/QMA	GR50QM	.0005	.0006
$\sqrt[4]{\text{Total Media/QMA}}$	MED4QM	.0013	.0012
$\sqrt[4]{\text{Total LAMS/QMA}}$	LAM4QM	.0010	.0009
$\sqrt[4]{\text{Total RAD/QMA}}$	RAD4QM	.0016	.0014
$\sqrt[4]{\text{Total Advertising/QMA}}$	AD4QM	.0019	.0017
Q GOAL/QMA	GOLQMA	.0005	.0002
Number Canvassers/QMA	CANQMA	.0003	.0000
Number Graduates/QMA	GRADQM	.2586	.0877
Unemployment Rate	UNEMP	.1823	.0093

Table 14

CORRELATION AMONG VARIABLES AFTER NORMALIZATION AND TRANSFORMATION

	ENLQMA	MED4QM	LAM4QM	RAD4QM	AD4QM	GOLQMA	CANQMA	GRADQM	UNEMP
ENLQMA	1.00	.69	.72	.72	.73	.05	.10	.33	.01
MED4QM		1.00	.90	.91	.96	.00	.08	.34	.08
LAM4QM			1.00	.91	.94	.05	.12	.32	-.05
RAD4QM				1.00	.98	-.02	.07	.31	.05
AD4QM					1.00	-.01	.08	.33	.03
GOLQMA						1.00	.39	.07	.11
CANQMA							1.00	.10	-.07
GRADQM								1.00	.00

relationships similar to that for AD4QM in Table 14. This was to be expected because they are a component of total advertising. The correlations ranged from .69 to .73. The implications of these correlations and their impact on the fitting of a linear model will be developed in the results section.

Model Fitting

The stepwise, multiple-regression program of the Statistical Package for the Social Sciences (SPSS) (Nie, et al., 1975) was used to fit the data. The regression was allowed to continue as long as the F statistic for the next variable to enter was significant at the .01 level and as long as the adjusted R square continued to increase with the entry of the variable. The regression with total (ENLQMA) and quality (GR50QM) enlistments was performed with total (ENLQMA) and quality (GR50QM) enlistments as the dependent variables. The lagged advertising variables are identified with the numbers 1 or 2 in the variable name to represent one or two months of lag.

The model being fitted was the following:

$$\begin{matrix} \text{ENLQMA} \\ \text{GR50QM} \end{matrix} = a + b_1X_1 + b_2X_2 + \ldots b_{17}X_{17} + e_{ij} \qquad (1)$$

where

a = constant
X_1 = AD4QM
X_2 = MED4QM
X_3 = LAM4QM
X_4 = RAD4QM
X_5 = AD14QM
X_6 = MED14QM
X_7 = LAM14QM
X_8 = RAD14QM
X_9 = AD24QM
X_{10} = MED24QM
X_{11} = LAM24QM
X_{12} = RAD24QM
X_{13} = GOLQMA
X_{14} = CANQMA
X_{15} = GRADQMA
X_{16} = GOLCAN
x_{17} = UNEMP
e_{ij} = residual

and the b are coefficients to be fitted from the data.

RESULTS

Exploratory Efforts

The effort to fit the model given in equation (1) was unsatisfactory. While the overall fit was quite good (adjusted R^2 = .556), the coefficients of the variables remaining in the equation were implausible and difficult to interpret. For example, total advertising lagged two months was the first to enter the equation and maintained a strong influence among the variables. Considerably later, however, current total advertising entered the equation with a negative sign. It was obvious that the multicollinearity caused by the inclusion of the total advertising variable in the equation along with its component variables made the fit unstable and fortuitous. An examination of Table 14 will show that the correlation of AD4QM with its component variables--MED4QM, LAM4QM, and RAD4QM--is .96, .94, and .98, respectively. The choice was to fit the equation with only the total advertising variables or without them. The latter alternative was chosen because it would be more informative to examine the effects of the separate advertising categories unconstrained by the domination of the total advertising variable. In addition, it had already been shown that the relationship of total advertising to enlistments was considerable as evidenced by a first-order correlation of .73 (Table 14). Accordingly, the model was reexamined without the three variables generated by total advertising, and the results are presented below.

Total Enlistments (ENLQMA) and Advertising

The results of the stepwise multiple regression of ENLQMA on the candidate independent variables are shown in Table 15. The adjusted R^2 is .556 with an F ratio of over 3419 for 11/30,071 $d.f.$ It is highly significant statistically. The standard error of estimate is very small. The 11 variables in the equation are able to capture 56 percent of the variance in 30,083 county-month cases in which new, male accessions to the Navy had occurred. Considering the large number of variables that have been suggested as influencing the enlistment of new recruits in the Navy, the power of this equation is certainly respectable.

The variables in Table 15 are listed in their order of entry. The F-at-entry is an evaluation of the incremental value of the variable when it entered the equation. The terminal F is the incremental value calculated for each variable when all other significant variables are already in the equation. Thus, the size of the terminal F provides an indication of the unique contribution of a variable. The column of coefficients is for the equation in data form, while Beta is the coefficient when all variables are standardized--i.e., have a zero mean and unit standard deviation. The raw coefficients are not comparable without a consideration of their scaling factors. On the other hand, the Beta coefficients are directly comparable.

Table 15

STEPWISE MULTIPLE REGRESSION OF TOTAL ENLISTMENTS (ENLQMA)

VARIABLE	COEFFICIENT	BETA	F AT ENTRY	TERMINAL F
LAM4QM	.20	.22	32,237	134
RAD4QM	.08	.14	1,378	71
GRADQM	.0009	.09	587	473
ME24QM	.05	.07	242	42
RD24QM	.12	.20	66	141
YR	.00009	.05	77	108
CANQMA	.51	.03	57	55
MED4QM	.05	.07	42	44
LM24QM	.14	.12	38	55
UNEMP	-.00002	-.02	23	24
LM14QM	-.11	-.12	22	22
Constant	.0004			

Adjusted R Square = .556 F = 3419.4

Standard Error = .00057 d.f. = 11/30071

The notable feature of the model fitting is the early appearance of each of the advertising categories in the equation. Current LAMS (LAM4QM) enters first and continues to have the most influence on total enlistments. Total media enters first when it is lagged for two months (MED24QM). Of the lagged variables, only those lagged two months have a positive effect on enlistments. The only variable entering the equation when it is lagged one month is LAMS, and it enters with a negative weight. The only other variable with a negative weight is unemployment. The other variables in the equation are GRADQM, YR, and CANQM, among which the high-school graduates variable provides the greatest effect. The year variable has a relative unique contribution to the equation. The variables that are absent, in addition to the advertising variables lagged one month, are those relating to goals: CANGOL and GOLQMA.

Quality Enlistments (GR50QM) and Advertising

The results of the stepwise multiple regression of quality enlistments (GR50QM) are shown in Table 16. Here, the adjusted R^2 is .737 with an F ratio of 5,270 which, for 10/20,645 d.f., is statistically highly significant. In this instance, 10 variables enter the equation and are able to account for 74 percent of the variance in 20,656 county-month cases in which at least one individual who was a high school graduate with an AFQT score in the upper half of the distribution was enlisted in the Navy. Again, considering the many factors that have been named as affecting enlistments, it is noteworthy that, in the case of these priority, quality enlistees, an even greater proportion of the total variation in county-month accessions can be accounted for.

The variables that enter the equation, their order of entry, and their relative effects are similar to those found for total enlistments (Table 15). The LAMS variable, lagged one month, which entered the previous equation with a negative coefficient does not appear in this equation, and canvassers per goal (CANGOL) replaces the canvassers per QMA variable. Again, goals per QMA is not a significant factor.

Summary Results

The results of this model fitting can be expressed in the two equations, below, that predict enlistments per QMA (equation (2)) and the quality enlistments per QMA (equation (3)).

Total Enlistment Rate

$$\begin{aligned} ENLQMA = .0004 &+ .0009 GRADQM + .00009\ YR + .5\ CANQMA \\ &+ .20\ LAM4QM + .08\ RAD4QM + .05\ MED4QM \\ &+ .14\ LM24QM + .11\ RD24QM + .05\ ME24QM \end{aligned} \quad (2)$$

Enlistment Rate of Quality Enlistees

$$\begin{aligned} GR50QM = .0001 &+ .0004\ GRADQM + .00008\ YR \\ &+ .16\ LAM4QM + .08\ RAD4QM + .06\ MED4QM \\ &+ .10\ LM24QM + .12\ TF24QM + .04\ ME24QM \end{aligned} \quad (3)$$

Table 16

STEPWISE MULTIPLE REGRESSION OF QUALITY ENLISTMENTS (GR50QM)

VARIABLE	COEFFICIENT	BETA	F AT ENTRY	TERMINAL F
LAM4QM	.16	.20	47,507	173
RAD4QM	.08	.14	1,977	81
ME24QM	.04	.06	410	33
GRADQM	.0004	.05	166	161
YR	.00008	.06	146	173
RD24QM	.12	.23	140	200
MED4QM	.06	.10	88	88
LM24QM	.10	.13	73	76
UNEMP	-.00001	-.01	12	8
CANGOL	.00003	.01	8	8
Constant	.0001			

Adjusted R Square = .737 F = 5784.8

Standard Error = .00035 d.f. = 10/20645

DISCUSSION

Study Methodology

The meticulous and tedious effort required to acquire, sanitize, and coordinate pieces of data from many different sources so that they provided a comprehensive picture of the many simultaneously operating factors thought to affect recruiting at a very low level of aggregation--a county for one month--has apparently provided a very reliable and revealing assessment of the relationship between Navy advertising variables and recruiting production. It is necessary, however, to examine the methods used in more detail to evaluate the possible fortuitious occurrences and biases that might have played a part in the findings and to bring out ways in which the methods could be improved in future study efforts.

First, the limitations of the data and the assumptions and procedures that were used in order to assign values for many variables to a specific county will be examined with a particular interest, at this point, in how they might have influenced the findings. The only data used in the study that actually originated at the county level were enlistments and the number of high-school graduates. In addition, a portion of the magazine circulation data was based on audited in-county circulation figures. The television and radio expenditures were also distributed on the basis of in-county survey statistics of audience viewing/listening habits. Almost half of magazine dollars were, however, distributed to counties from state circulation data on the basis of Sales Management 1977 population statistics. The outdoor advertising and the LAMS and RAD dollars were distributed to counties on the basis of the QMA. Moreover, the QMA is, itself, assigned to counties in an even more arbitrary manner from 400 "large" counties that were used to update the 1970, census-based QMA. That is, the country was divided into 400 areas that were studied for population trends and the trends were then used to update the QMA for each of the counties within one of the larger areas. Considerable solace can be taken from the fact that the QMA used in this study and high-school graduates in 1976 had a correlation of .97 (Table 11). Accordingly, the current QMA does seem to be a reasonable measure of the manpower pool for potential enlistees in a county, and its use as a normalizing variable in this study is sustained. The results obtained in this study are, however, valid only to the degree that the variables distributed on a population basis are in fact distributed that way in the real world. If, for example, LAMS dollars are used within an NRD to purchase listings of the recruiting stations in all telephone book yellow pages then it would be reasonable to assume that the monies were distributed on a population basis. On the other hand, if LAMS dollars were used for advertisements in school newspapers at certain large metropolitan high schools within an NRD, then such dollars might not be distributed evenly over the district's counties. The ultimate solution to this problem is to set up data systems so that they can readily yield actual placement of advertising dollars at a very local level.

Another possible drawback in this study was the need to distribute LAMS and RAD expenditures temporally--i.e., spread quarterly values over three months equally. Not only did this necessity make it difficult or impossible to obtain a valid assessment of these variables lagged in time, but the practice tended to increase multicollinearity in the data. For example, the current, one-month lagged and two-month lagged LAMS and RAD variables were identical in every third month of a quarter. This multicollinearity in the data seems to be the explanation for the negative coefficient for LAM14QM in the total enlistments equation (Table 15) and for total advertising lagged one month (AD14QM) in the exploratory analysis (Nie, et al., 1975). In addition, the high intercorrelation among the three advertising categories--media, LAMS, and RAD--also contributed to multicollinearity (Table 11). A partial solution to the problem would be to collect data routinely at a finer temporal interval. For example, the monthly enlistment summary prepared by the recruiting command has enormous detail with respect to the recruiting effort, but it includes no advertising or promotions data. Were advertising data reported along with the other data, it would facilitate greatly the routine monitoring and tracking of the relationship between advertising and production. In passing, however, it should be noted that the significant part played by the variables lagged two months must be even greater in reality, since the method required in this study probably produced an underestimate of lagged effects.

An effort was not made to differentiate the effects of the national media because, as shown in Tables 4 and 5, there was such great variability among months in the two-year period in the utilization of the media. Only magazines, followed by direct-mail advertising, are reasonably represented throughout the study period. But seasonality in advertising expenditures and the advent of paid radio and television advertising at different points in the study period virtually made it impossible to enter the media independently in the model being fitted. The year dummy, however, is a broad indicator of advertising without (1976) and with (1977) paid, electronic media. It played a small, but unique part in the fitted equations for both total enlistments (equation (2)) and quality enlistments (equation (3)). Table 17 shows the media expenditures, average monthly canvasser strength, and the output of total and quality enlistments for 1976 and 1977. The input variables, canvassers and media expenditures were considerably higher for 1977, but the output of the system in new recruits was considerably smaller--almost by 20 percent for the quality recruits. A better assessment of the differential relationships between national media expenditures and recruit production could be made by using only those months in which all media are represented. The scope of this effort did not permit analysis in that degree of detail.

Another problem encountered in the study was the matter of time coincidence in the LAMS and RAD expenditures with the actual advertisement or promotional item appearing in the field. At the NRD level, it is possible to determine when a specific item of advertisement was

Table 17

Comparison of Media Advertising with and without Paid Electronic Media and Concurrent Goal Accomplishment

Item	1976*	1977
Total Q enlistments	101,568	88,556
Quality enlistments	51,309	37,495
Canvassers**	3,212	3,360
Media expenditures	3,916,371	5,803,669

*Includes one month of paid radio advertising; includes December 1976.

**Average per month strength.

scheduled to appear through pruchase-order files. If the commitment of funds is taken as the effective data, it will predate the actual advertisement; if the payment is the effective date, the actual appearance of the advertisement will be postdated. If the funds are just programmed monies, then it is not possible to tell when advertisements actually appeared. The RAD items, in addition to similar problems, have the additional problem that they are ordered merely to maintain inventory; the actual date of use is not determinable by any records. Thus, spreading quarterly data equally over three months probably tended to average out (smooth) any idiosyncracies in the data. On the other hand, when they were used as lagged variables, there was undoubtedly considerable deviation of the actual advertising from the precise month in which they were assumed to have appeared.

The foregoing paragraphs concerned problems in the data, primarily. There were also arbitrary, study decisions that limit the generality of the results. First, there was the item of zero enlistments and excessive enlistment rates in counties that were excluded from the model fitting. While it was shown that the smallness of the counties was a factor in their being outliers, there was also a suggestion that differential rates of advertising--at least for the excessive-rate outliers--might have been related to their being outliers. The results of the study, as conducted, would tend to reinforce this possibility. A different model could be used to examine the relationship further. Finally, being exploratory, this was a single-equation study and causal inferences cannot be made unambiguously. This does not mean that a tight, two-stage analysis for causal attribution, as described by James and Singh (1978) is possible, but an attempt should be made. The data are sufficient, however, to make a simultaneous equation, recursive analysis as described by Aaker and Kay (1974) to permit better inferences about the directionality of the effects.

Finally, it is obvious that the methods used cannot provide any indication of the appropriateness and effectiveness of the message being delivered. As the author was once told, "What you say makes a difference, too." But, as explained in Part I of this study, the message and the appropriateness of its reach and frequency belong to a set of participants in the advertising and marketing world that is quite apart from those who worry about expenditues and the bottom line. Nonetheless, the two areas must be joined to make valid inferences about the effectiveness of advertising.

Advertising Effectiveness and Its Evaluation

As stated, this study cannot assess the directional (causal) relationships between advertising and recruit production. But it can make inferences from the relationships seen between them. Specifically, the changes that take place in the relationships between advertising and production in the gross (raw) variables, normalized variables, and transformed variables will be examined as a process that could reveal

the adequacies and inadequacies in the allocation of advertising resources. It should be emphasized, at this point, that the fit of the linear model is only adequate when the actual allocation of advertising has been changed drastically by the transformation used.

To begin with, gross (raw) advertising dollars--along with goals, canvassers, and enlistments--are closely related to the QMA, as shown in Table 11. The average correlation (using Fisher's z transformation) is .72 between the four advertising categories in the table and the QMA. It should come as no surprise that populous counties are provided more advertising dollars than small counties. Slightly more than 50 percent of the variability in advertising dollars per county-month can be predicted on the basis of the QMA, alone. This leaves approximately half of the variability unexplained. Table 11 also shows that total enlistments are even more highly related to the QMA ($r = .92$). This implies that, while both gross advertising expenditures and gross enlistments are related to the QMA, they are not related to it in the same degree or, perhaps, in the same manner. This seems to account for the considerably smaller average correlation of .65 between the advertising categories and enlistments in Table 11.

When the advertising and enlistment variables were normalized for their common QMA, the intercorrelations between them became essentially zero (Table 12), thus confirming the above-made suggestion that they related in a qualitatively different manner to the QMA. Since enlistments and advertising were originally correlated to a considerable degree and both were highly correlated with the QMA, it was obviously necessary to transform one of the variables to recapture the original relationship. As described in the methods section, taking the fourth root of advertising before dividing by the QMA reestablished linearity in the variables so that, as shown in Table 13, the average correlation between enlistments per QMA and the advertising variables per QMA returned to .72.

The question with respect to advertising is, "Why does the relationship between advertising and production break down completely when they are expressed as rate variables with a common index?" The answer, in general terms, would seem to be that enlistments per QMA are fairly constant compared to advertising per QMA, which is more variable and tends to be large for the QMA when enlistments are not. The specific question then becomes, "Under what circumstances does this discrepancy between enlistments and advertising--with respect to the QMA--occur?"

The implications of the fourth-root transformation for advertising can be seen in Table 18, where contingency tables between enlistments per QMA and total advertising per QMA are presented for the case before (Table 18a) and the case after (Table 18b) the transformation. Before transformation (Table 18a), advertising expenditures are indiscriminately high with many cases of high advertising rates being associated with low enlistment rates. This is clearly evident when the lower-right and upper-right quadrants of the before-transformation

Table 18

JOINT DISTRIBUTION OF TOTAL ENLISTMENTS/QMA WITH TOTAL ADVERTISING/QMA
BEFORE AND AFTER FOURTH ROOT TRANSFORMATION OF ADVERTISING

BEFORE TRANSFORMATION (a)

ENLISTMENTS/QMA					
.002	212	557	334	193	94
	431	1080	596	375	179
	880	2166	1221	744	398
.001	1805	4308	2524	1406	906
0	1238	2846	1684	1012	607
	0	.08			.16

Total Adv/QMA

AFTER TRANSFORMATION (b)

ENLISTMENTS/QMA				
.002	322	521	425	122
	939	990	718	14
.001	2876	2224	309	0
	8209	2734	6	0
0	7332	55	0	0
	0		.004	

$\sqrt[4]{\text{Total Adv}}$/QMA

matrix are compared. Expenditures in the lower-right quadrant are roughly five times higher.

As seen in Table 18 (b), the fourth-root transformation compresses the range of the advertising variable and moves the many cases from the pretransformation, lower-right quadrant to the lower-left, where they belong. That is, large advertising rates are no longer going into counties with bad enlistment rates. At the same time, the formerly very large advertising rates which are still represented in the right half of Table 18 (b) are now associated with the high enlistment rates in the upper-right quadrant, where they belong. The transformation necessary to achieve this condition indicates that high advertising rates per QMA are indiscriminately high and tend to be made on poor-producing areas to a greater degree than on the better or exceptionally well producing areas. The fit appears to be better for low advertising rates, in that they are associated more closely with the low producing counties rather than the high. Also, a smaller number of very high advertising rates are appropriately related to high-producing areas.

The reason that this condition exists may be that the Recruitment Development Index (RDI), which is a measure of the relative potential of an area for enlistments, may be quite large compared to the counties used as a basis for analysis in this study. Since the RDI is used as a basis for the allocation of resources, an area with a moderate or even high RDI may have significant pockets of very poor potential within them. Nevertheless, these poor areas share the largesse in advertising that appears to be warranted for the entire area. Further research with the data available in this study could identify the exact county-months where the enlistment rate is poor but the advertising rates are high. Since the LAMS and RAD advertising categories--which are the easiest to control geographically--are also the most closely associated with the enlistment rates in the fitted equations, and especially so with the quality enlistees (Table 16), it would appear that an effort should be made to identify those counties where the large discrepancies occur. It could also be argued that these discrepant cases are artifacts caused by the necessity to allocate NRD-level data to counties in proportion to their QMA; in actuality, those NRD resources might be more discretely and effectively allocated. This possibility could be investigated by comparing the present data with the actual data that should be available at the NRD level. For example, it would not be difficult to identify where large LAMS expenditures are not accompanied by high enlistment rates and then go to the NRDs involved and check the purchase order files.

A more theoretical question posed by the foregoing analysis is to what degree should advertising expenditures track the enlistment rate? Should they be greater in areas with poorer enlistment rates to develop the enlistment potential in the area, or should they be greater where the enlistment rate is high to ensure continuation of,

and even improve, those rates? The answer to this question would be difficult to obtain using naturally occurring data because the conditions necessary to answer the question would occur too infrequently. The alternative would be well controlled levels experiments.

The nonadvertising variables that helped raise the multiple-regression estimates of enlistment rates over the first-order correlations of advertising with enlistments should be mentioned. Of these, the effects of the year dummy have already been examined in the discussion of study methodology, above. Another variable with a significant effect was high school graduates per QMA. Since the correlation of the raw data for high school graduates and QMA is .97, the value of the variable should have been rather constant. (The ratio of the standard deviation to the mean as seen in Table 10 is 1:3.) Nevertheless, it enters both equations and makes a modest but significant contribution to the predicted enlistment rates (Tables 15 and 16). Thus, the quality of an area as defined by the ratio of high school graduates to the QMA contributes to higher enlistment rates. This is consistent with Arima's (1978b) finding that the best, single predictor of individual recruiter productivity was a high school enrollment measure. Moreover, he found that a combination of educational variables predicted 35 percent of the variability in individual recruiter productivity.

The other variable to enter the equations was a measure of the variability in canvasser strength per county with respect to a county's QMA or recruiting goals (Q goals). The intercorrelation among canvassers, goals, and the QMA ranges from .92 to .98 in Table 11 and are obviously driven by the QMA. Thus, it would not seem to make a great deal of difference whether the variable is canvassers per QMA or per goal. In either case, the contribution to the equation is small, but statistically very significant. As small as the variation in canvassers per QMA seems to be in actuality, it is important to note that, when a rate variable--such as enlistments per QMA--is used as the production variable, the latter is very sensitive to variability in the distribution of canvassers with respect to goals or the QMA.

Finally, a variable that is very significant by its failure to enter the regression equations is goals per canvasser. It is generally assumed that goals drive the recruiting system and a rate variable, such as enlistments per QMA, ought to be very sensitive to another rate variable such as goals per QMA. While nonlinearity in these rate variables could have been a factor contributing to this lack of effect, there are other cogent reasons. With the extension of the delayed entry program (DEP) to one year, the importance of goals is mediated by the status of DEP enlistments for a particular NRD. If the DEP pool is well filled, goals will not have a significant effect on current-month canvassing activity. If the goal for the current month can be readily met but the DEP pool is severely depleted, current-month canvassing may very well be quite active. To state the case in another way,

it was formerly acdknowledged that goals could be a lid on production, but this is no longer the case when the DEP pool also requires filling. The goal may be a lid on current production when it is defined as shipments to the RTC, but not on production defined as numbers taking the oath of enlistment--i.e., contracts signed, as used in this study. Thus, it would appear that an uncontrolled variable that could have accounted for a significant portion of the unexplained variance--and would have to be controlled or used as a covariate for any levels experiment--is a relationship between goals and the DEP pool for a given organization (NRD). This would be a difficult variable to quantify, since a time function is also involved. That is, the DEP status 12 months from the current month does not have the urgency that the DEP status of the next month has. Moreover, the urgency of the DEP status in the out months is also determined by the projected goals for those months. It may be that good and bad management of the recruiting effort could be very closely related to the way that the current effort is managed with respect to the goals/DEP relationship in the out months. Unfortunately, no measure exists to quantify the drive that this relationship should--or does--provide for the recruiting effort.

SUMMARY AND CONCLUSIONS

This part of the study was an empirical examination of the relationship between advertising and enlistments while taking into account the allocation of recruiters, assignment of goals, the population of high school graduates and qualified military availables (QMA), and the monthly, national, unemployment rate for young people. Values for these variables were obtained, assigned, or allocated to each county in the contiguous United States. The unit of analysis was by county by month for calendar years 1976 and 1977 of those county-months that had at least one enlistment. In addition, advertising variables were lagged for one and two months, and enlistments reflected quality as well as quantity of first-term male enlistees.

The principal findings were:

1. The allocation of advertising resources, canvassers, and goals and the production of enlistments were highly interrelated and all were closely related to the county's QMA. These relationships were a reflection of managerial planning and not of independent cause-effect relationships.

2. When the variables were normalized (indexed) by the QMA and made into rate variables that reflected quality as well as the gross quantity aspects of recruiting operations, the relationships seen in the gross (raw) data were highly attenuated and the linear relationship between advertising and enlistments disappeared.

3. In general, increasing advertising rates were not accompanied by any systematic change in enlistment rates. In particular, higher advertising rates were accompanied by a greater frequency of counties with low, rather than high, enlistment rates.

4. A fourth root transformation of the advertising variables before division by the QMA was necessary to establish linearity between enlistment rates and advertising rates to permit the fitting of a linear, least-squares regression model to the data.

5. The fitted equations accounted for 56 percent of the variation in total enlistment rates and 74 percent of the variation in the enlistment rates of quality enlistees. The transformed LAMS and RAD variables in their current and lagged two-months versions had the greatest effect; the transformed national media rates, especially lagged two months, also affected the enlistment rate. The dummy variable for year (1976, 1977) and the population of high school graduates per QMA provided moderate, but unique influences on the enlistment rate.

6. The significant year dummy provided an opportunity to assess the effects of a major change in media mix--with and without paid, electronic media advertising. In 1977, with more advertising dollars and canvassers and the full implementation of paid radio and television advertising, enlistments were considerably lower.

7. Utilization of the Recruitment Development Index (RDI) by the recruiting command and its advertising agency for planning and resource allocation does not seem to be working well. The problem, if one exists, could be because the size of the area used in developing the RDI may be too large so that pockets of poor potential within a otherwise high-potential area receive relatively too much advertising. Another possibility is that the enlistment rate used in the RDI is based on NRD production in terms of shipments to the RTCs (instead of contracts signed). Shipments are primarily a function of management decision and, as shown in 1 and 2, above, do not reflect the true production of an area with respect to its potential.

8. The goals variable was highly related to gross production but, when indexed by the QMA, it did not influence the enlistment rate, as expected. It was suggested that goals must be related to the DEP status of a unit before they play a significant role on the effort to obtain new contracts. Since the DEP pool extends for one year in time, a measure that combines goals and DEP status into a single variable that is a measure of the force that drives enlistments will be complex and difficult to create, but it is sorely needed for management and research programs.

REFERENCES

Aaker, D. A. (Ed.) Multivariate analysis in marketing. Belmont, Calif.: Wadsworth, 1971.

Aaker, D. A., & Day, G. S. A dynamic model of relationships among advertising, consumer awareness, attitudes, and behavior. Journal of Applied Psychology, 1974, 59, 281-286.

Aaker, D. A., & Myers, J. G. Advertising management. Englewood Cliffs, N.J.: Prentice-Hall, 1975.

Ackoff, R. L., & Emshoff, J. R. Advertising research at Anheuser-Busch, Inc. (1963-68). Sloan Management Review, 1975, 17(2), 1-15. (a)

Ackoff, R. L., & Emshoff, J. F. Advertising research at Anheuser-Bushc, In. (1968-1974). Sloan Management Review, 1975, 17(3), 1-15. (b)

Ajzen, I., & Fishbein, M. Attitude-behavior relations: a theoretical analysis and review of empirical research. Psychological Bulletin, 1977, 84, 888-918.

Allaire, Y. SMR Forum: A multivariate puzzle: A comment on "advertising Research at Anheuser-Busch, Inc. (1963-68)." Sloan Management Review, 1975, 17 (3), 91-94.

Arima, J. K. A systems analysis of Navy recruiting (Special Report 76-9). San Diego, Calif.: Navy Personnel Research and Development Center, April 1976. Also available in: JSAS Catalog of Selected Documents in Psychology, 1977, 7, 59 (Ms. 1504).

Arima, J. K. Educational and training opportunities as incentives for military service. (NPS 54-78-3) Monterey, Calif.: Naval Postgraduate School, 1978. (a)

Arima, J. K. Determinants and a measure of Navy recruiter effectiveness (NPRDC TR 78-21). San Diego, Calif.: Navy Personnel Research and Development Center, June 1978. (b)

Bass, F. M. A simultaneous equation regression study of advertising and sales of cigarettes. Journal of Marketing Research, 1969, 6, 291-300.

Blalock, H. M. Jr. Causal inferences in nonexperimental research. Chapel Hill, N. C.: University of North Carolina, 1964.

Brown, G. H., Wood, M. D., & Harris, J. D. Army recruiters: criterion development and preliminary validation of a selection procedure (FR-ED-75-8). Alexandria, VA: Human Resources Research Organization, April 1975.

Comanor, W. S., & Wilson, T. A. Advertising and market power. Cambridge, Mass.: Harvard University Press, 1974.

Dhalla, N. K. How to set advertising budgets. Journal of Advertising Research, 1977, 17, 11-24

Dhalla, N. K. Assessing the long-term value of advertising. Harvard Business Review, 1978, 56, 87-95.

Engel, J. F., Kollat, D. T., & Blackwell, R. D. Consumer behavior. (2nd ed.) Hinsdale, Illinois: Dryden, 1973.

Ferguson, J. M. Advertising and competition; theory, measurement, fact. Cambridge, Mass.: Ballinger, 1974.

Festinger, L. A theory of cognitive dissonance. Stanford, Calif.: Stanford University Press, 1957.

Finney, M. A. Probit analysis--a statistical treatment of the sigmoid response curve. Cambridge: University Press, 1947.

Fishbein, M., & Ajzen, I. Attitudes and opinions. In P. H. Mussen and M. R. Rosenzweig (Eds.), Annual review of psychology. Palo Alto, Calif.: Annual Reviews, 1972.

Friedman, L. Measuring the effectiveness of advertising--a case history. Paper presented at the AMA Workshop on Determination, Allocation, and Control of Marketing Expenditures, New York, June 1971.

Friedman, L. A survey of advertising awareness and enlistment planning by recent enlistees in the armed services. Princeton, N.J.: Mathematica, October 1972. (NTIS No. AD 752 064)

Horsky, D. Market share response to advertising: an example of theory testing. Journal of Marketing Research, 1977, 14, 10-21.

Jacoby, J. Consumer psychology: an octennium. In M. R. Rosenzweig and L. W. Porter (Eds.), Annual Review of Psychology. Palo Alto, Calif.: Annual Reviews, 1976.

James, L. R.,& Singh, B. K. An introduction to the logic, assumptions, and basic analytic procedures of two-stage least squares. Psychological Bulletin, 1978, 85, 1104-1122.

Kassarjian, H. H., & Robertson, T. S. Perspectives in consumer behavior. Glenview, Ill.: Scott, Foresman, 1973.

Kiesler, C. A., Collins, B. E., & Miller, N. Attitude change: critical analysis of theoretical approaches. New York: Wiley, 1969.

Krugman, H. E. What makes advertising effective? Harvard Business Review, 1975, 53, 96-103.

Lipstein, B., & McGuire, W. J. Evaluating advertising: a bibliography of the communication process. New York: Advertising Research Foundation, 1978.

Little, J. D. C. A model of adaptive control of promotional spending. Operations Research, 1966, 14, 1075-1097.

Little, J. D. C. BRANDAID: a marketing-mix model, part 1: structure. Operations Research, 1975, 23, 628-655.

Little, J. D. C. BRANDAID: a marketing-mix model, part 2: implementation, calibration, and case study. Operations Research, 1975, 23, 656-673.

Naylor, T. H., & Finger, J. M. Verification of computer simulation models. Management Science, 1967, 14, B-92--B-101.

Nie, N. H., Hull, C. H., Jenkins, J. G., Steinbrenner, K., & Bent, D. H. Statistical package for the social sciences (2nd Ed.). New York: McGraw-Hill, 1975.

Palda, K. S. The measurement of cumulative advertising effects. Englewood Cliffs, N. J.: Prentice-Hall, 1964.

Rao, A. G. Quantitative theories in advertising. New York: Wiley, 1970.

Rhodes Associates. Evaluation of Navy advertising effectiveness (N62271-7206-5700 Final Report). Stanford, Calif.: Author, 1978.

Schmalensee, R. The economics of advertising. New York: American Elsevier, 1972.

Shane, H. D. Mathematical models for economic and political advertising campaigns. Operations Research, 1977, 25, 1-14.

Simonton, D. K. Cross-sectional time-series experiments: some suggested statistical analyses. Psychological Bulletin, 1977, 84, 489-502.

Sullivan, R. J. Developing a measure of Marine Corps recruiting effectiveness. Unpublished master's thesis, Naval Postgraduate School, 1976.

Ted Bates & Co. NRD media allocation report. New York, N.Y.: Author, 1978.

Van Horn, R. L. Validation of simulation results. Management Science, 1971, 17, 247-258.

Williams, T. C., Jr. Effectiveness of Navy advertising. Unpublished master's thesis, Naval Postgraduate School, September 1978.

Wilson, T. R., & Rosen, T. H. ProsLab--a method for pretesting printed Army recruiting advertisements. (Consulting Report). Alexandria, Va.: Human Resources Research Organization, May 1973. (NTIS No. AD A043 743)

Yee, A. H., & Gage, N. L. Techniques for estimating the source and direction of causal influence in panel data. Psychological Bulletin, 1968, 70, 115-126.

Young, J. W. The function of theory in a dilemma of path analysis. Journal of Applied Psychology, 1977. 62, 108-110.

ABBREVIATIONS

ABC	Audited Board of Circulation
AFQT	Armed Forces Qualification Test
ARB	Advertising Research Bureau
ASVAB	Armed Service Vocational Aptitude Battery
AVF	All-volunteer Force
CNRC	Commander, Navy Recruiting Command
DEP	Delayed Enlistment Program
DMDC	Defense Data Management Center
HumRRO	Human Resources Research Organization
LAMS	Local Advertising Management System
NALTS	Navy Lead Tracking System
NCFA	Navy Campus for Achievement
NNRIC	National Navy Recruiting Information Center
NOIC	Navy Opportunities Information Center
NRA	Navy Recruiting Area
NRD	Navy Recruiting District
QMA	Qualified Military Available(s)
QUEBEC ("Q")	Male applicant at least 17 years of age without prior service
RAD	Recruiting Aids Division, also recruiting aids produced by Recruiting Aids Division
RDI	Recruitment Development Index
RTC	Recruit Training Center
TAR	Training and Administration of the Reserve
USAREC	U.S. Army Recruiting Command
USN	U.S. Navy (Regular Navy)
USNR	U.S. Naval Reserve
USP	Unique selling proposition
VCS	Visual Campaign Summary

DISTRIBUTION LIST

	No. of Copies
Defense Documentation Center Cameron Station Alexandria, Virginia 22314	2
Library, Code 0142 Naval Postgraduate School Monterey, CA 93940	2
Office of Research Administration Code 012A Naval Postgraduate School Monterey, California 93940	1
Library, Codes 54 and 55 Naval Postgraduate School Monterey, California 93940	1
Prof. J. Arima Code 54Aa Naval Postgraduate School Monterey, CA 93940	20
Dr. A. J. Martin Director, Accession & Retention OASD (MRA&L) Washington, D.C. 20301	1
Director, Total Force Programming (OP-12) Dept. of the Navy Washington, D. C. 20370	1
Dr. M. K. Malehorn (OP-102) Dept. of the Navy Washington, D. C. 20370	1
Dr. Kneale T. Marshall Scientific Adviser (OP-01T) Dept. of the Navy Washington, D. C. 20370	1
Office of Naval Research Codes 450 430 431 452 800 N. Quincy Street Arlington, VA 22217	1 1 1 1
Dr. H. Wallace Sinaiko Smithsonian Institution 801 N. Pitt Street Alexandria, VA 22314	1

	No. of Copies
Dr. Eugene E. Gloye ONR Branch Office 1030 E. Green St. Pasadena, CA 91101	1
Director, Research/Analysis Div. (Code 22) Navy Recruiting Command 4015 Wilson Blvd. Arlington, VA 22203	1
Director, Management Systems Div. (Code 43) Recruiting Advertising Department Navy Recruiting Command 4015 Wilson Blvd. Arlington, VA 22203	1
Technical Director (Code 01) Navy Personnel R&D Center San Diego, CA 92152	1
Dr. Earl I. Jones (Code 05) Navy Personnel R&D Center San Diego, CA 92152	1
Dr. Richard Sorenson (Code 03) Navy Personnel R&D Center San Diego, CA 92152	1
Dr. Martin F. Wiskoff (Code 310) Navy Personnel R&D Center San Diego, CA 92152	1
Technical Director Army Research Inst. for the Behavioral & Social Sciences 5001 Eisenhower Avenue Alexandria, VA 22333	1
Dr. E. R. Dusek ARI/PERI-IZ 5001 Eisenhower Ave. Alexandria, VA 22333	1
Technical Director AFHRL Brooks AFB, TX 78235	1
Dr. Joe Ward AFHRL/ORS Brooks AFB, TX 78235	1

No. of Copies

Ronald G. Liveris
Headquarters, USAREC
Ft. Sheridan, IL 60037 1

Air Force Recruiting Service
Headquarters, Air Training Command
Randolph Air Force Base, TX 78148 1

Director
Army Personnel Research Establishment
Farnborough, Hants.
United Kingdom 1

1 Psychology Research Unit
Department of Defense (Army Office)
Campbell Park Offices
CANBERRA ACT 2600
Australia 1